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INSTALLATION RESTORATION PROGRAM

PHASE I - RECORDS SEARCH

AIR FORCE PLANT NO. 83

ALBUQUERQUE, NEW MEXICO

PREPARED FOR

HQ AFESC/TIC (FL 7050)
Technical [illegible] Center
Bldg 1120 [illegible]
Tyndall AFB FL 32403-6001

UNITED STATES AIR FORCE

HQ AFESC/DEV

Tyndall AFB, Florida

and

HQ ASD/PMD

Wright Patterson AFB, Ohio

DECEMBER 1983

ES ENGINEERING-SCIENCE

NOTICE

This report has been prepared for the United States Air Force by Engineering-Science for the purpose of aiding in the Air Force Installation Restoration Program. It is not an endorsement of any product. The views expressed herein are those of the contractor and do not necessarily reflect the official views of the publishing agency, the United States Air Force, nor the Department of Defense.

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Cameron Station
Alexandria, Virginia 22314

INSTALLATION RESTORATION PROGRAM
PHASE I - RECORDS SEARCH

AIR FORCE PLANT NO. 83
Albuquerque, New Mexico

Prepared For

UNITED STATES AIR FORCE
HQ AFESC/DEV
Tyndall AFB, Flordia
and
HQ ASD/PMD
Wright Patterson AFB, Ohio

December 1983

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EXECUTIVE SUMMARY

The Department of Defense (DOD) has developed a program to identify and evaluate past hazardous material disposal sites on DOD property, to control the migration of hazardous contaminants, and to control hazards to health or welfare that may result from these past disposal operations. This program is called the Installation Restoration Program (IRP). The IRP has four phases consisting of Phase I, Initial Assessment/Records Search; Phase II, Confirmation and Quantification; Phase III, Technology Base Development; and Phase IV, Operation/Remedial Actions. Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I, Initial Assessment/Records Search for Air Force Plant No. 83 under Contract No. F08637-80-G0009-5009.

INSTALLATION DESCRIPTION

Air Force Plant No. 83, otherwise known as General Electric Aircraft Engine Business Group's Albuquerque Plant, is located in the southern portion of Albuquerque, New Mexico. The plant site is approximately one mile due west of Kirtland Air Force Base. The facility is comprised of approximately 30 major buildings which cover 586,790 square feet within a 33-acre area.

Surrounding land uses include residential to the north, heavy and light industrial to the west (including the Eidal Manufacturing Plant, which manufactures tractors; a vacant manufacturing plant; and a construction equipment storage yard), light industrial to the south (including a packing plant and an auto salvage yard), and light and heavy industrial and residential to the east (including Texaco's oil storage facility; a deep freeze locker storage facility; Conoco's storage facility; a vacant lot, and a small residential area). The area within one-fourth mile of the plant is populated by less than 1,000 people.

General Electric Company (GE) operates industrial facilities at Air Force Plant No. 83. GE has been at Plant No. 83 since 1967, when the Air Force assumed ownership of the plant from the Atomic Energy Commission (AEC).

GE operations at Air Force Plant No. 83 involve the manufacturing of aircraft engine parts, sub-assemblies, and spare parts for military and commercial jet engines. Operations include machining, fiber laminate composition, investment casting, and shrouds and seals manufacturing.

Prior to 1967, there were three separate occupants in the area now occupied by GE. From 1948 to 1951, Fidal Manufacturing Company, a machine shop and heavy equipment builder was the first known occupant of the plant site. Buildings No. 5 and No. 11 were the only buildings on the site during that period. In 1951 the site was purchased by the AEC. From 1951 until about 1967, American Car and Foundry, Incorporated (ACF) served as the AEC contractor. Manufacturing operations included forming, welding, plating, and machining metal parts and structures, and molding and machining plastics. Just prior to the Air Force's purchase and GE's subsequent occupation of Plant 83, Dow Chemical Company joined with ACF in the operation of a portion of the facility for about 6 months. This was done for the purpose of training Dow on how to duplicate ACF's methods and skills so that the same products could be thereafter manufactured by Dow at the AEC's Rocky Flats Plant. Dow was not permitted during this time to institute any changes in the methods, materials, processes or practices being used.

ENVIRONMENTAL SETTING

The environmental setting data reviewed for this investigation indicate that the following elements are relevant to the evaluation of past hazardous waste management practices at Air Force Plant No. 83:

1. The normal annual precipitation is 7.77 inches; the net precipitation is -54.23 inches and the 1-year, 24-hour rainfall event is estimated to be 1.25 inches. These data indicate that there is little or no potential for precipitation to infiltrate the surface soils on the plant property. Also, there is a slight potential for runoff and erosion.
2. There is limited area on the plant property where natural soils are exposed. Most of the plant property is covered by asphalt or concrete. The natural soils on the property are typically clayey

or sandy loam with low permeability values. These data indicate that recharge by precipitation infiltrating the soils will be slow.

3. Surface water in the vicinity of the plant may recharge the shallow water-table aquifer or may flow downstream in the San Jose Drain to the Rio Grande River.
4. Clay is a dominant lithologic unit under the plant which may limit the vertical migration of ground water.
5. Alluvial deposits of sand, gravel, cobbles and clay underly the plant. Water levels are approximately 15 to 20 feet below ground within the shallow alluvial deposits.
6. Water levels within the deeper alluvial depostis and the Santa Fe group (undivided) are approximately 35-50 feet deep. These data indicate that a shallow water-table aquifer exists under the plant and a potential exists for the horizontal and vertical migration of ground water from the shallow water-table aquifer to the regional water-table aquifer.
7. Ground-water contamination has been detected in shallow monitoring wells on the plant property.
8. The direction of ground-water flow within the shallow water-table aquifer cannot be determined based on available data.
9. The regional ground-water flow direction is east and northeast from the plant to major water producing wells for the City of Albuquerque.
10. The operation of wells SJ3 and SJ6 may impact the ground-water conditions underlying the plant in both the shallow and regional water-table aquifers.
11. The plant is located in a "declared underground water basin" which is the sole source aquifer for Albuquerque's water supply.
12. There are no Federally- or state-listed endangered or threatened species which inhabit the plant property.

METHODOLOGY

During the course of this project, interviews were conducted with plant personnel (past and present) familiar with past waste disposal practices; file searches were performed for past hazardous waste activities; interviews were held with local, state and Federal agencies; and

a field tour was conducted at past hazardous waste activity sites. All suspected sites were investigated and five sites were identified as potentially containing hazardous contaminants resulting from past activities (Figure 1). These sites have been assessed using a Hazard Assessment Rating Methodology (HARM) which takes into account factors such as site characteristics, waste characteristics, potential for contaminant migration, and waste management practices. The details of the rating procedure are presented in Appendix E and the results of the assessment are given in Table 1. The rating system is designed to indicate the relative need for follow-on investigations.

FINDINGS AND CONCLUSIONS

The following conclusions have been developed based on the results of the project team's field inspection, review of base records and files, and interviews with base personnel. Each of the five sites listed below were ranked using the HARM system and were determined to have a sufficient potential for environmental contamination to warrant some degree of follow-on investigation.

North Parking Lot

Hazardous Waste Storage No. 1

Hazardous Waste Storage No. 3

Hazardous Waste Storage No. 4

Underground Cyanide Vault

RECOMMENDATIONS

A program for proceeding with Phase II of the IRP at Air Force Plant No. 83 is presented in Chapter 6. The Phase II recommendations are summarized as follows:

North Parking Lot - Soil Sampling, Install and Sample Monitoring Wells.

Hazardous Waste Storage No. 1 - Soil Sampling, Install and Sample Monitoring Wells.

Hazardous Waste Storage No. 3 - Soil Sampling, Install and Sample Monitoring Wells.

Hazardous Waste Storage No. 4 - Soil Sampling, Install and Sample Monitoring Wells.

TABLE 1

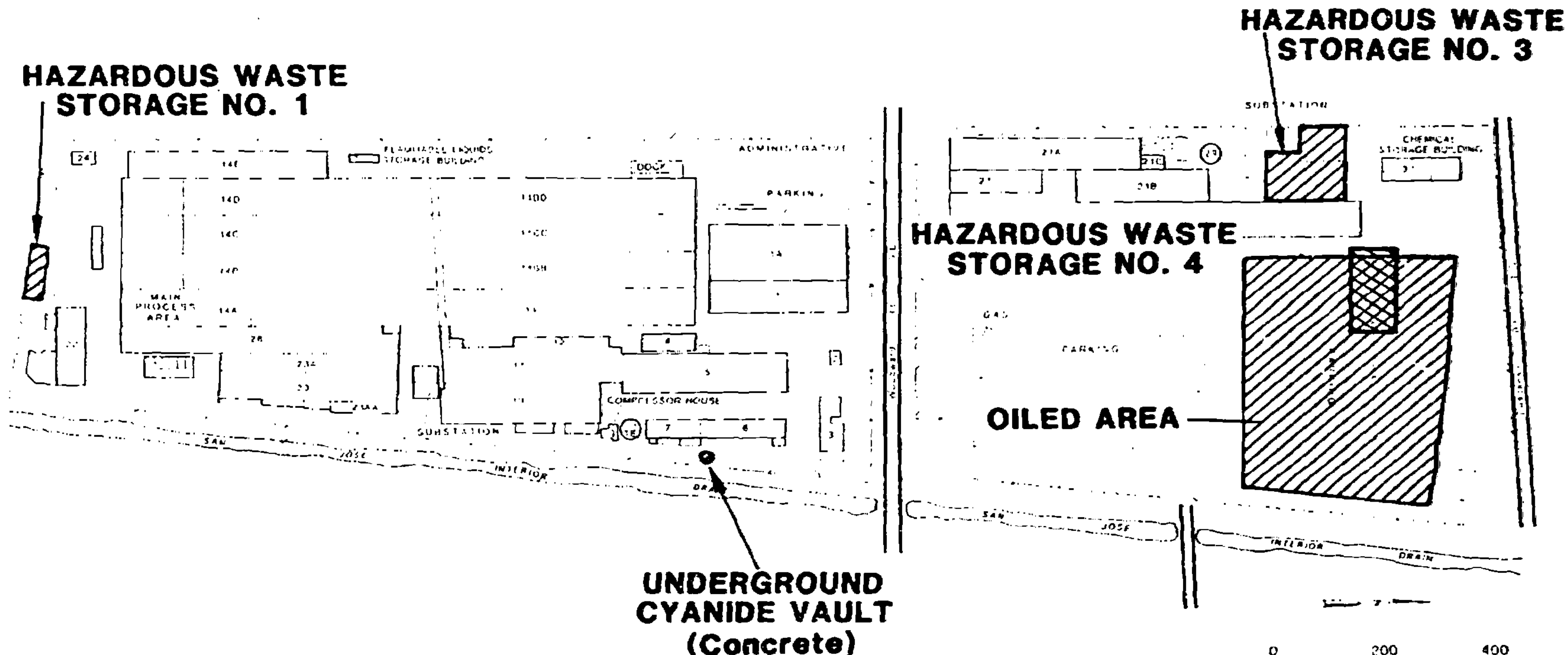
SITES EVALUATED USING THE HAZARD ASSESSMENT
RATING METHODOLOGY
AIR FORCE PLANT NO. 83

Rank	Site	Operating Period	Final HARM Score
1	North Parking Lot	1979-1980	64
1	Hazardous Waste Storage No. 1	1954-Present	62
2	Hazardous Waste Storage No. 3	Late 1950's to Present	60
4	Hazardous Waste Storage No. 4	Mid 1970's-1981	54
5	Underground Cyanide Vault	Mid 1950's to Late 1970's	51

FIGURE 1

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

SITES OF POTENTIAL ENVIRONMENTAL CONTAMINATION



SOURCE: USAF PLANT NO. 83 DOCUMENTS

Underground Cyanide Vault	- Locate, investigate and analyze contents. If leakage has occurred, install and sample monitoring wells.

CHAPTER 1

INTRODUCTION

BACKGROUND

The United States Air Force, due to its primary mission of defense of the United States, has long been engaged in a wide variety of operations dealing with toxic and hazardous materials. Federal, state, and local governments have developed strict regulations to require that disposers identify the locations and contents of past disposal sites and take action to eliminate hazards in an environmentally responsible manner. The primary Federal legislation governing disposal of hazardous waste is the Resource Conservation and Recovery Act (RCRA) of 1976, as amended. Under Section 6003 of the Act, Federal agencies are directed to assist the Environmental Protection Agency (EPA) and under Section 3012, state agencies are required to inventory past disposal sites and make the information available to the requesting agencies. To assure compliance with these hazardous waste regulations, the Department of Defense (DOD) developed the Installation Restoration Program (IRP). The current DOD IRP policy is contained in Defense Environmental Quality Program Policy Memorandum (DEQPPM) 81-5, dated 11 December 1981 and implemented by Air Force message dated 21 January 1982. DEQPPM 81-5 reissued and amplified all previous directives and memoranda on the Installation Restoration Program. DOD policy is to identify and fully evaluate suspected problems associated with past hazardous contamination, and to control hazards to health and welfare that resulted from these past operations. The IRP will be the basis for response actions on Air Force installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, and clarified by Executive Order 12316. CERCLA is the primary federal legislation governing remedial actions at past hazardous waste disposal sites.

PURPOSE AND SCOPE OF THE ASSESSMENT

The Installation Restoration Program has been developed as a four-phased program as follows:

Phase I - Initial Assessment/Records Search
Phase II - Confirmation and Quantification
Phase III - Technology Base Development
Phase IV - Operations/Remedial Actions

Engineering-Science (ES) was retained by the United States Air Force to conduct the Phase I Records Search at Air Force Plant No. 83 under Contract No. F08637-80-G0009-5009. This report contains a summary and an evaluation of the information collected during Phase I of the IRP and recommendations for follow-on actions.

The goal of the first phase of the program was to identify the potential for environmental contamination from past waste disposal practices at Air Force Plant No. 83, and to assess the potential for contaminant migration. The activities that were performed in the Phase I study included the following:

- Review of site records
- Interview of personnel familiar with past generation and disposal activities
- Surveys of types and quantities of wastes generated
- Determination of estimated quantities and locations of current and past hazardous waste treatment, storage, and disposal
- Definition of the environmental setting at the plant
- Review of past disposal practices and methods
- Field tour of plant facilities
- Collection of pertinent information from Federal, state, and local agencies
- Assessment of potential for contaminant migration
- Development of follow-on recommendations.

ES performed the on-site portion of the records sea ı during October 1983. The following team of professionals were involved:

- R. E. Mayfield, Environmental Engineer and Project Manager, MSCE, 6 years of professional experience
- M. I. Spiegel, Environmental Scientist, BS Environmental Science, 6 years professional experience
- H. D. Harman, PG, Hydrogeologist, BS Geology, 8 years professional experience.

More detailed information on these three individuals is presented in Appendix A.

METHODOLOGY

The methodology utilized in the Air Force Plant No. 83 Records Search began with a review of past and present industrial operations conducted at the plant. Information was obtained from available records and files, as well as interviews with past and present plant employees from the various operating areas. Those interviewed included current and past personnel associated with ACF, Dow and General Electric Company. A listing of the plant interviewee positions and approximate years of service is presented in Appendix B.

Concurrent with the plant interviews, the applicable Federal, state, and local agencies were contacted for pertinent plant-related environmental data. The agencies contacted and interviewed are listed below and additional information is included in Appendix B.

- U.S. Department of Energy (DOE)
- U.S. Environmental Protection Agency (EPA), Region VI
- U.S. Geological Survey (USGS), Water Resources Division
- U.S. Department of Defense DOD, Defense Logistics Agency
- U.S. Army Corps of Engineers
- Middle Rio Grande Conservancy District
- New Mexico State Engineers Office
- New Mexico Health and Environment Department (NMHED)
- City of Albuquerque, Water Resources Department
- City of Albuquerque, Water Systems Division

The next step in the activity review was to identify all sources of hazardous waste generation and to determine the past management practices regarding the use, storage, treatment, and disposal of hazardous materials from the various operations at the plant. Included in this part of the activities review was the identification of any past disposal sites and other possible sources of contamination such as spill areas.

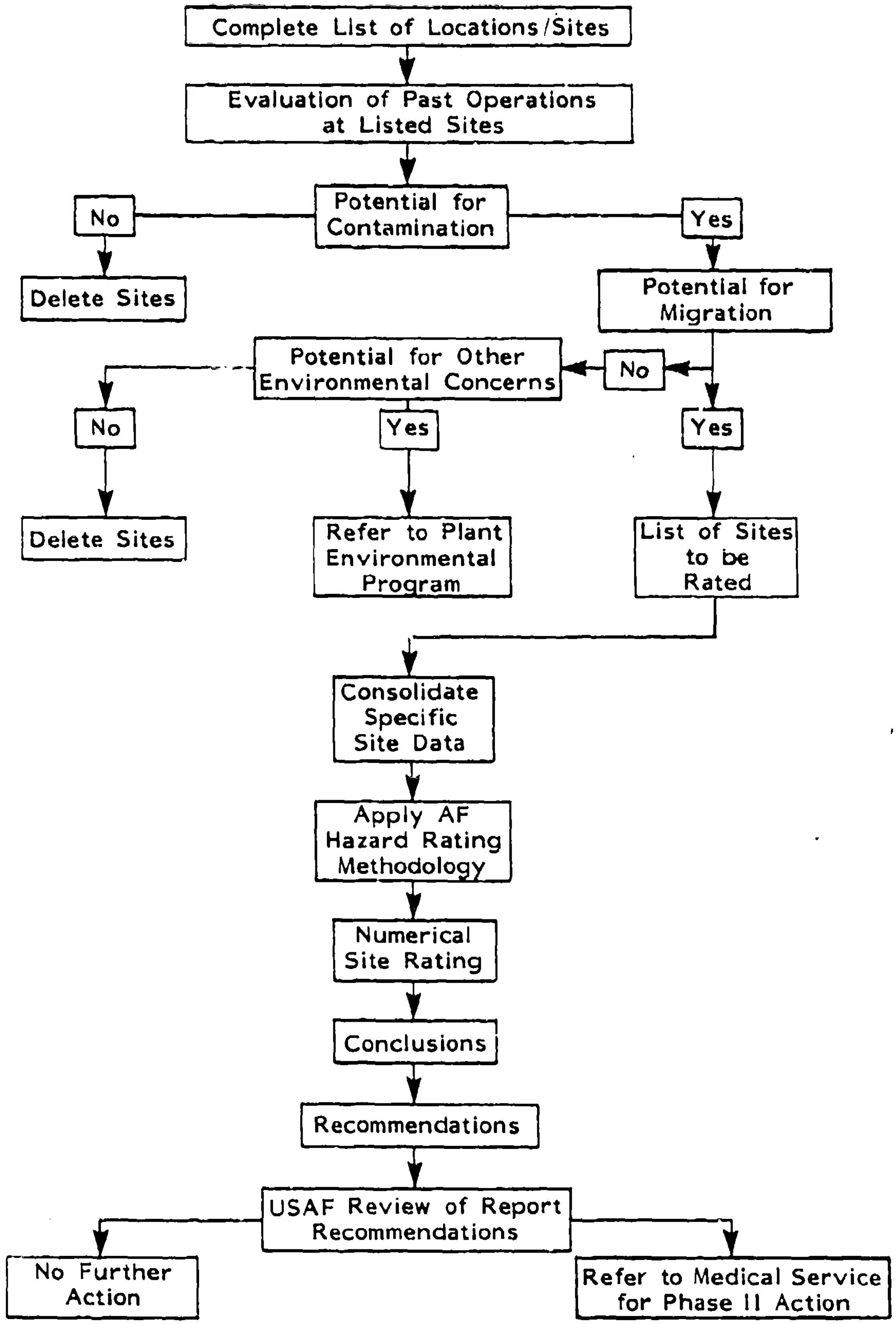
A general ground tour of the identified sites was then made by the ES Project Team to gather site-specific information including: (1) visual evidence of environmental stress; (2) the presence of nearby drainage ditches or surface water bodies; (3) visual inspection of these water bodies for any obvious signs of contamination; and (4) past waste management site conditions.

A decision was then made, based on all of the above information, whether a potential existed for hazardous material contamination at any of the identified sites using the Decision Tree shown in Figure 1.1. If no potential existed, the site was deleted from further consideration. For those sites where a potential for contamination was identified, a determination of the potential for migration of the contamination was made by considering site-specific conditions. If no potential for contaminant migration exists but other environmental concerns were identified, the site was referred to the plant environmental protection program. If there were no further environmental concerns identified, then the site was deleted. If the potential for contaminant migration was considered significant, then the site was evaluated and prioritized using the Hazard Assessment Rating Methodology (HARM). A discussion of the HARM system is presented in Appendix E. The sites that were evaluated using the HARM procedures were also reviewed with regard to future land use restrictions.

FIGURE 1.1

PHASE I INSTALLATION RESTORATION PROGRAM

DECISION TREE



CHAPTER 2

INSTALLATION DESCRIPTION

LOCATION, SIZE AND BOUNDARIES

Air Force Plant No. 83, otherwise known as General Electric Aircraft Engine Business Group's Albuquerque Plant, is located in the southern portion of Albuquerque, New Mexico (Figure 2.1). The plant site is approximately one mile due west of Kirtland Air Force Base (Figure 2.2). The facility is comprised of approximately 30 major buildings which cover 586,970 square feet within a 33-acre area (Figure 2.3).

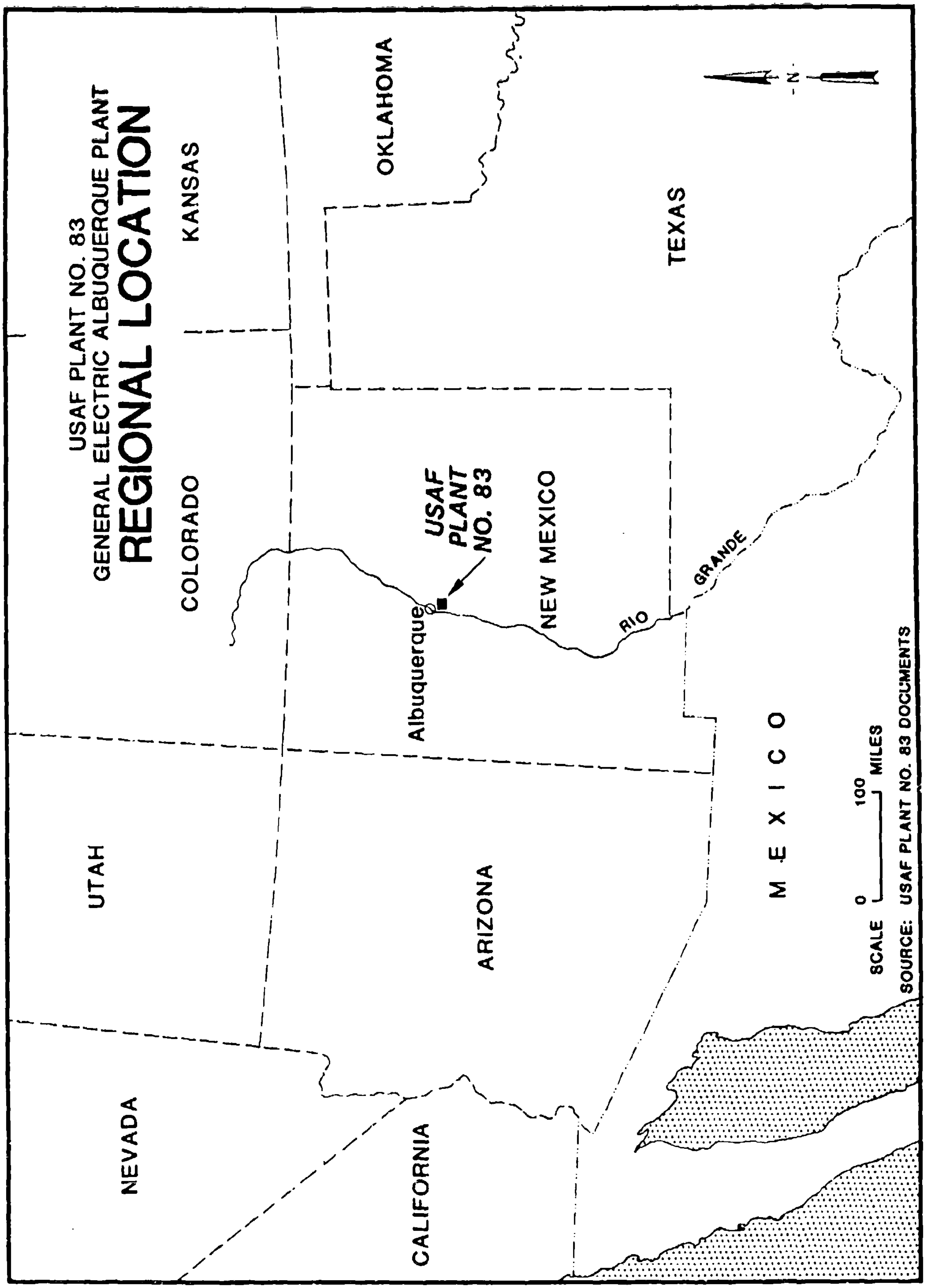
Surrounding land uses include residential to the north, heavy and light industrial to the west (including the Eidal Manufacturing Plant, which manufactures tractors; a vacant manufacturing plant; and a construction equipment storage yard), light industrial to the south (including a packing plant and an auto salvage yard), and light and heavy industrial and residential to the east (including Texaco's oil storage facility; a deep freeze locker storage facility; Conoco's storage facility; a vacant lot, and a small residential area). The area within one-fourth mile of the plant is populated by less than 1,000 people.

HISTORY

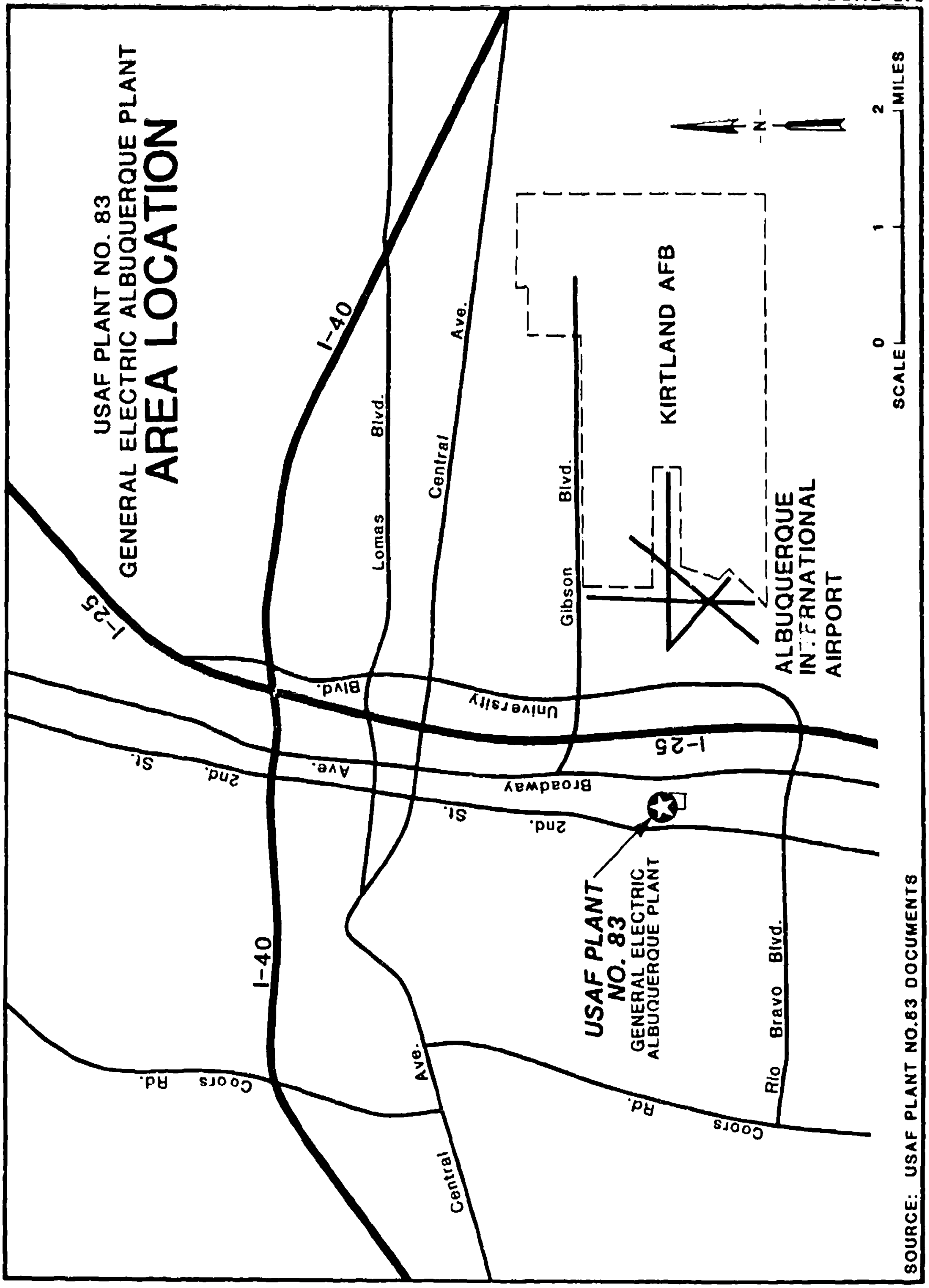
General Electric Company (GE) operates industrial facilities at Air Force Plant No. 83. GE has been at Plant No. 83 since 1967 when the Air Force assumed ownership of the plant form the Atomic Energy Commission (AEC).

GE operations at Air Force Plant No. 83 involve the manufacturing of aircraft engine parts, sub-assemblies, and spare parts for military and commercial jet engines. Operations include machining, fiber laminate composition, investment casting, and shrouds and seals manufacturing.

FIGURE 2.1



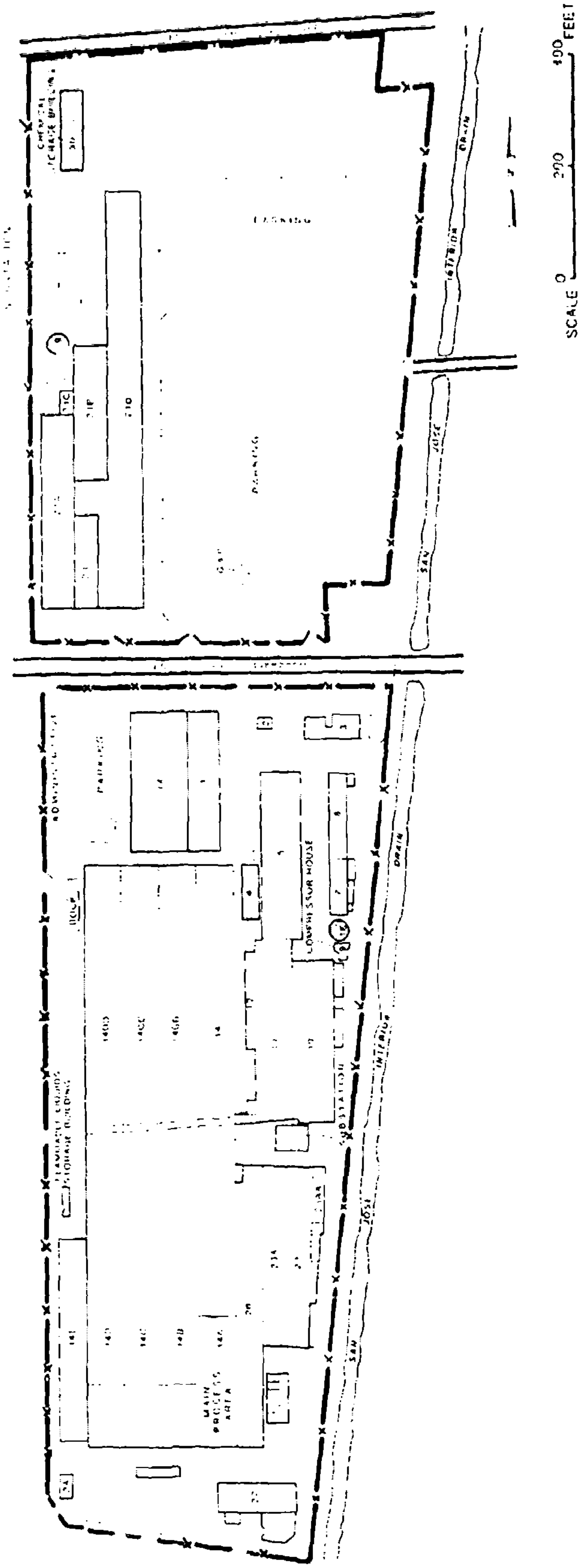
USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
REGIONAL LOCATION
KANSAS
OKLAHOMA
COLORADO
TEXAS
USAF PLANT NO. 83
NEW MEXICO
Albuquerque
RIO GRANDE
UTAH
ARIZONA
NEVADA
CALIFORNIA
M E X I C O
N
SCALE
0
100
MILES
SOURCE: USAF PLANT NO. 83 DOCUMENTS



USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
AREA LOCATION

SOURCE: USAF PLANT NO.83 DOCUMENTS

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
SITE PLAN

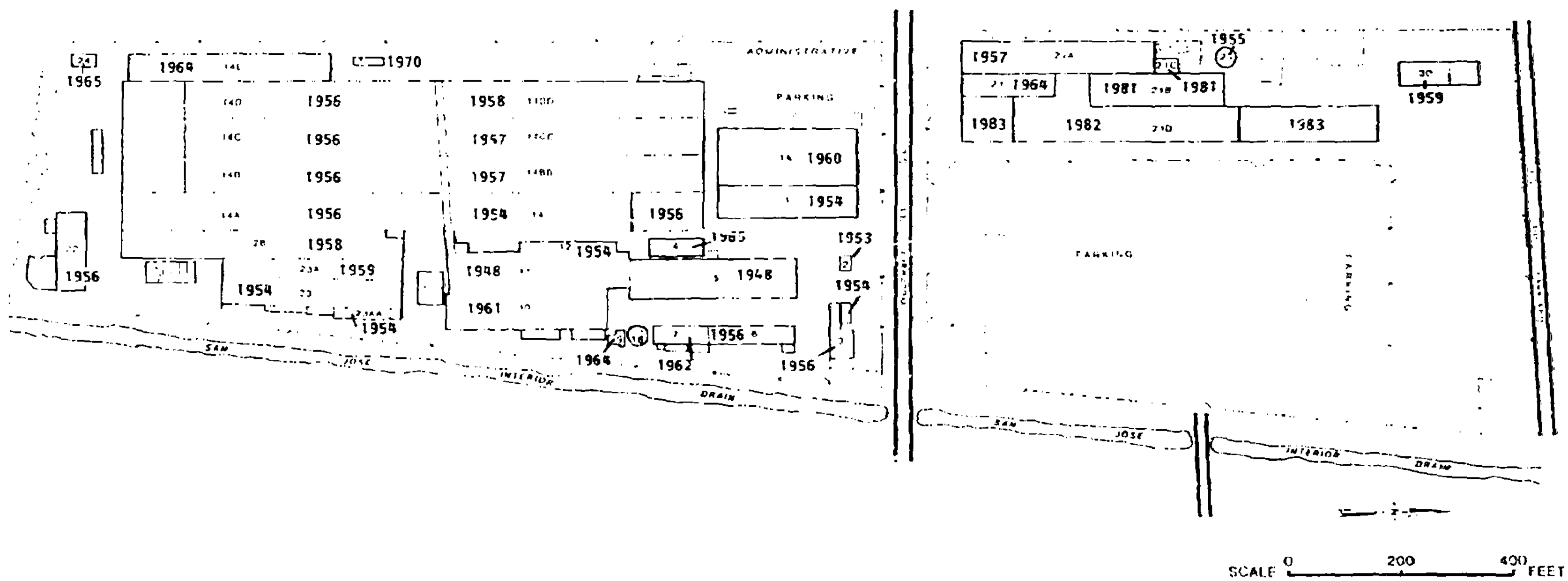


SOURCE: USAF PLANT NO. 83 DOCUMENTS

Prior to 1967, there were three separate occupants in the area now occupied by GE. From the late 1948 to 1951, Eidal Manufacturing Company, a machine shop and heavy equipment builder, was the first occupant of the plant site. Buildings No. 5 and No. 11 were the only buildings on the site during that period. In 1951, the site was purchased by the AEC. From 1951 until about 1967, American Car and Foundry (ACF), Incorporated, served as the AEC contractor. Manufacturing operations included forming, welding, plating, and machining metal parts and structures, and molding and machining plastics. Just prior to the Air Force's purchse and GE's subsequent occupation of Plant 83, the Dow Chemical Company joined with ACF in the operation of a portion of the facility for about 6 months. This was done for the purpose of training Dow on how to duplicate ACF's methods and skills so that the same products could be thereafter manufactured by Dow at the AEC's Rocky Flats Plant. Dow was not permitted during this time to institute any changes in the methods, materials, processes or practices being used.

A chronology of the facility construction is depicted on Figure 2.4.

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
CHRONOLOGY OF FACILITY CONSTRUCTION



SOURCE: USAF PLANT NO. 83 DOCUMENTS

CHAPTER 3

ENVIRONMENTAL SETTING

The environmental setting of USAF Plant No. 83 is described in this chapter with an emphasis on the identification of natural features that may promote the movement of hazardous waste contaminants. Environmental conditions pertinent to this study are summarized at the conclusion of this chapter.

METEOROLOGY

The climate of Albuquerque is characterized by a large number of sunny days and low humidity. Temperature extremes may vary from a high of 100°F on summer days to a low of 15°F on winter nights. This "Arid Continental" type of climate is usually dry with brief but heavy thundershowers occurring from July to September. Very little rainfall occurs during the winter months (National Oceanic and Atmospheric Administration (NOAA), 1983). Selected meteorological data for Albuquerque are summarized in Table 3.1.

Two climatic features of interest in determining the potential for movement of contaminants are net precipitation and rainfall intensity. Net precipitation is an indicator of the potential for leachate generation and is equal to the difference between precipitation and evaporation. Rainfall intensity is an indicator of the potential for excessive runoff and erosion. The one-year, 24-hour rainfall event is used to gauge the potential for runoff and erosion. Net precipitation at Plant No. 83 is minus (-) 54.23 inches as determined from meteorological records. Normal annual precipitation at the Albuquerque International Airport for the period 1941-1970 is 7.77 inches (NOAA, 1983) and the mean annual lake evaporation for the area is 62 inches (NOAA, 1979). The negative value of net precipitation indicates that there is little or no potential for precipitation to infiltrate the surface soils on the plant property. The presence of asphalt and concrete covering a

TABLE 3.1

CLIMATIC CONDITIONS FOR USAF PLANT NO. 83

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TEMPERATURE (°F)												
Normal	35.2	40.0	45.8	55.8	65.3	74.6	78.7	76.6	70.1	58.2	44.5	36.2
PRECIPITATION (Inches)												
Normal	0.30	0.39	0.47	0.48	0.53	0.50	1.39	1.34	0.77	0.79	0.29	0.52
Maximum Monthly	1.32	1.42	2.18	1.97	3.07	1.71	3.33	3.30	1.99	3.08	1.45	1.85
SNOWFALL (Inches)												
Maximum Monthly	9.5	8.2	13.9	8.1	1.0	0.0	0.0	0.0	T	0.9	9.3	14.7

Note: T = Trace
Period of Record: 1941-1970
Source: NOAA, 1983

majority of the plant property further reduces infiltration. The one-year, 24-hour rainfall event in the area of the plant is estimated to be 1.25 inches (NOAA, 1963). This value indicates that there is a slight potential for runoff and erosion. Although the one-year, 24-hour rainfall event is small, the presence of asphalt and concrete covering a majority of the plant property increases the potential for runoff and erosion.

GEOGRAPHY

Plant No. 83 is located in the Basin and Range Physiographic Province (Figure 3.1). Within the Basin and Range Province it is located in the northern portion of the Mexican Highland Section (Wells, et al., 1981). The plant is further located in the Rio Grande Valley between the West Mesa and East Mesa (Figure 3.2). The Rio Grande is the major river flowing south through the valley.

Topography

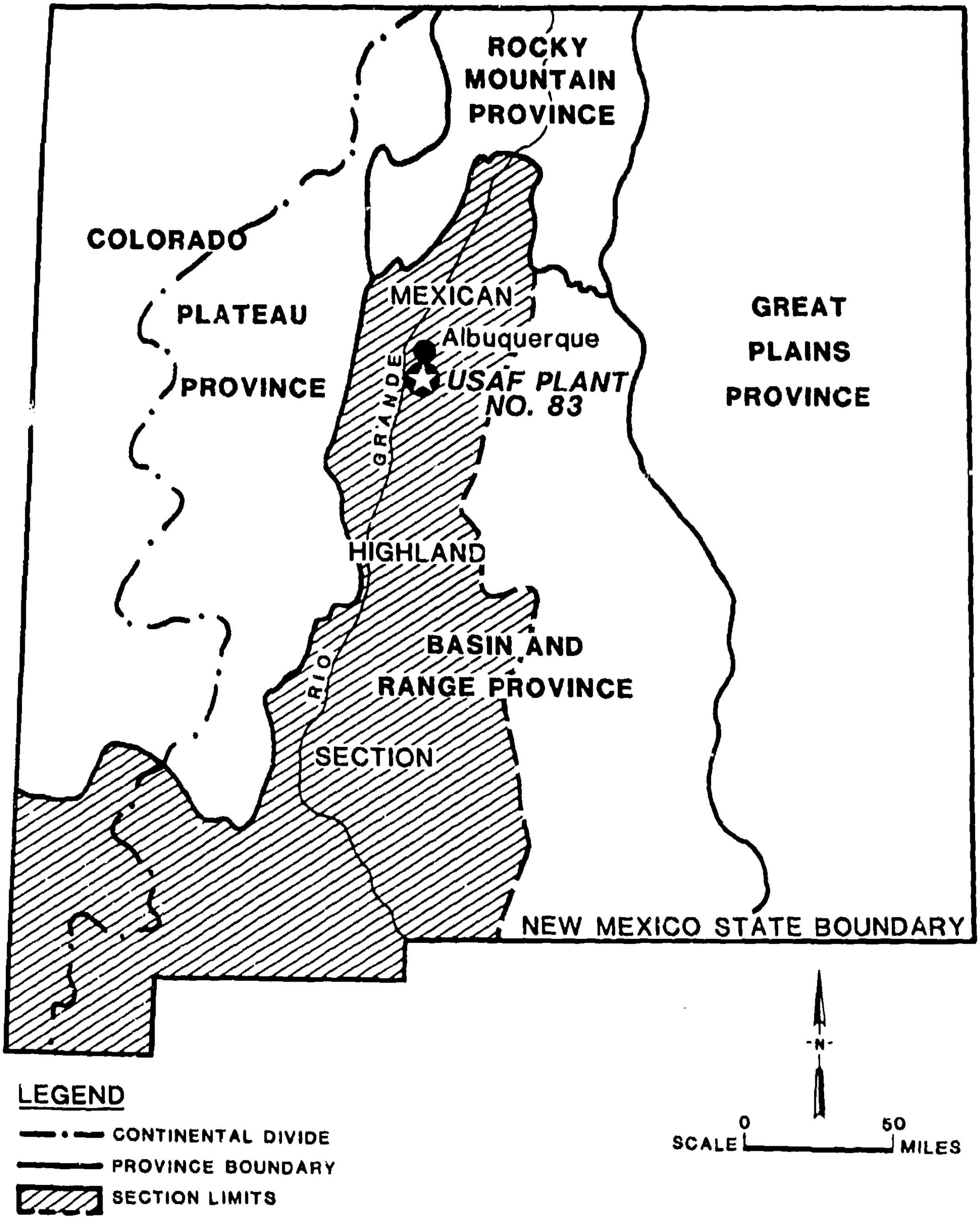
The topography of the general area in which the plant is located is quite spectacular with three major topographic features. These features are the Sandia Mountains, the East and West Mesas and the Rio Grande Valley. The Sandia Mountains, rising to a crest of 10,682 feet above the National Geodetic Vertical Datum of 1929 (NGVD), are the most spectacular features of the area. From the foothills of the mountains the land surface gradually decends to the East Mesa with an average elevation of 5,000 feet NGVD. The West Mesa, across the Rio Grande, and the East Mesa comprise another major topographic feature of the plant area. The third major topographic feature of the area is the Rio Grande Valley. The valley is approximately four miles wide near the plant. The plant is located approximately 0.7 miles east of the Rio Grande in what is called the South Valley of Albuquerque. The land surface of the plant itself is relatively flat with an average elevation of 4,940 feet NGVD. The immediate area surrounding the plant is developed for industrial uses.

Soils

The natural exposed surface soils of Plant No. 83 are limited in area. Only areas near the administration buildings (1A, 1 and 3) and

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

REGIONAL PHYSIOGRAPHIC FEATURES

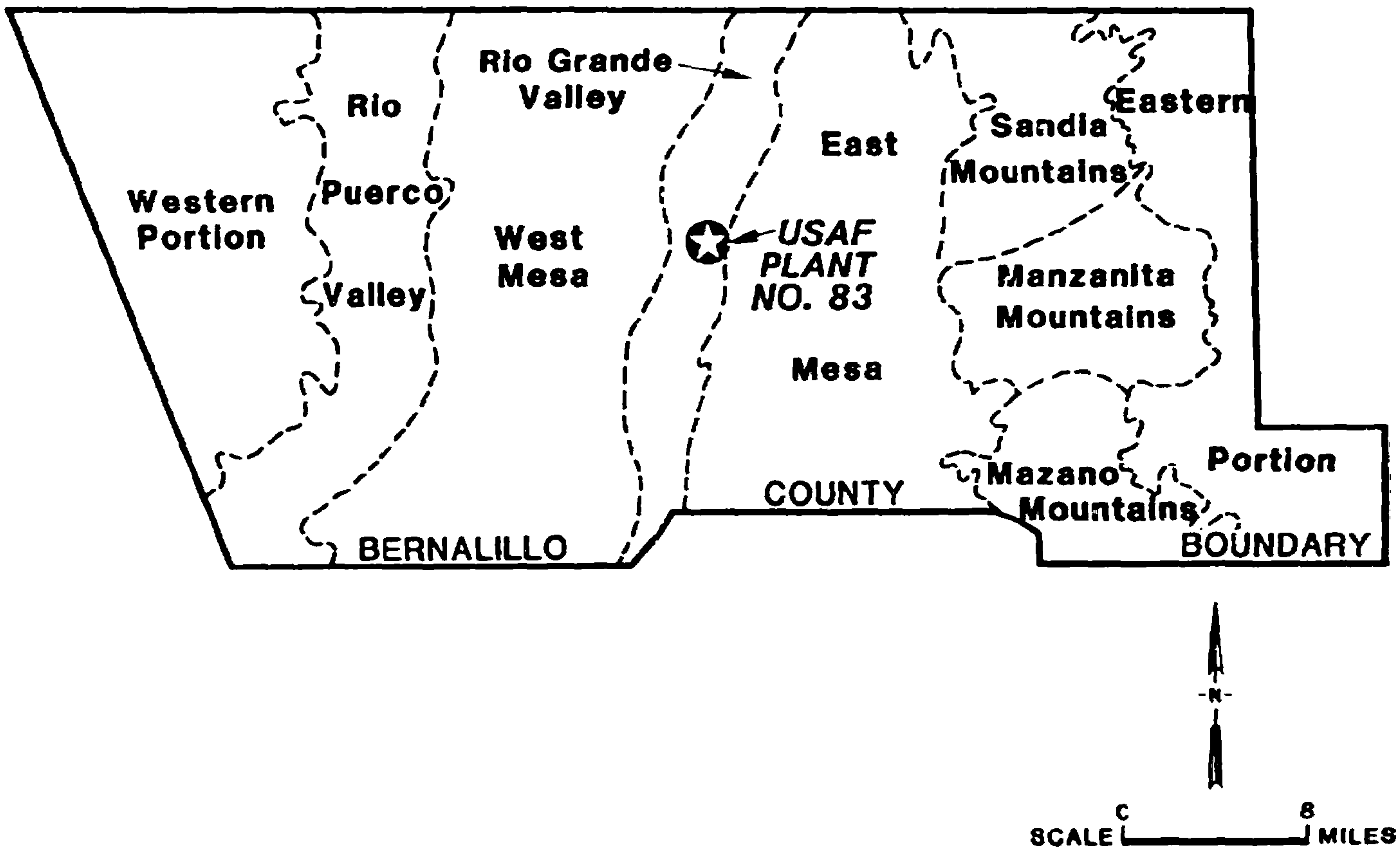


SOURCE: WELLS, LAMBERT AND CALLENDER, 1981

FIGURE 3.2

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

LOCAL PHYSIOGRAPHIC FEATURES



SOURCE: USDA, SCS, 1977

the extreme northern portion of the plant have exposed soils; all other areas are covered by asphalt or concrete. The natural soils are characterized by clayey and sandy loam. Loam is a soil with varying proportions of clay, sand and organic matter. The soils are mapped on Figure 3.3 and their descriptions and engineering properties are summarized on Table 3.2. The soil property of concern in assessing the potential for surface-water infiltration is permeability. The permeability values for the type soils in the area of the plant range from 0.00042 centimeters per second (cm/sec) to 0.0014 cm/sec (Hacker, 1977). The actual values at the plant may vary from these type soil values due to increased percentages of localized sand underlying the plant. The values indicate that surface water will move relatively slowly through the surface soils of the plant. The Soil Conservation Service (SCS) has ranked the type soils underlying the plant as having severe use limitations for septic tank absorption fields. The SCS has noted wetness and slow percolation as reasons for the severe use limitations.

SURFACE-WATER RESOURCES

USAF Plant No. 83 is located in the Rio Grande Drainage Basin. In the Albuquerque area a system of ditches, drains and canals in the valley regulates the directions and flow rates of surface water to and from the Rio Grande. The system, maintained by the Middle Rio Grande Conservancy District, was constructed to alleviate problems related to drainage, flood control and irrigation of crop land in the Rio Grande Valley (Shah, 1983). Levees and riverside drains protect areas in the valley from floods.

Drainage

Drainage from Plant No. 83 is controlled by twelve discharge outfall points from the plant property to the San Jose Drain which borders the plant on its eastern side. Fourteen previously open discharge outfall points were plugged in 1978. The outfalls are connected to above-ground and underground drain lines which control the storm drainage and permitted discharges from the plant. Figure 3.4 shows the surface drainage map for the plant. The San Jose Drain flows south through a fully concreted ditch north of Woodward Road and an unlined ditch south of Woodward Road. The unlined portion supports

TABLE 3.2

SOILS DATA FOR USAF PLANT NO. 83 AND VICINITY

Symbol on Figure 3.3	Unit Description	Depth Below Ground (inches)	[1] Permeability (centimeters/second)	Septic Tank Absorption Field Use Limitations
Gd	Gila loam, moderately alkali	0-60	4.2×10^{-4} to 1.4×10^{-3}	[2] Severe: wet
Gk	Glendale loam	0-60	1.4×10^{-4} to 4.2×10^{-4}	Severe: percolation slow
Gm	Glendale clay loam	0-60	1.4×10^{-4} to 4.2×10^{-4}	Severe: percolation slow

Note:

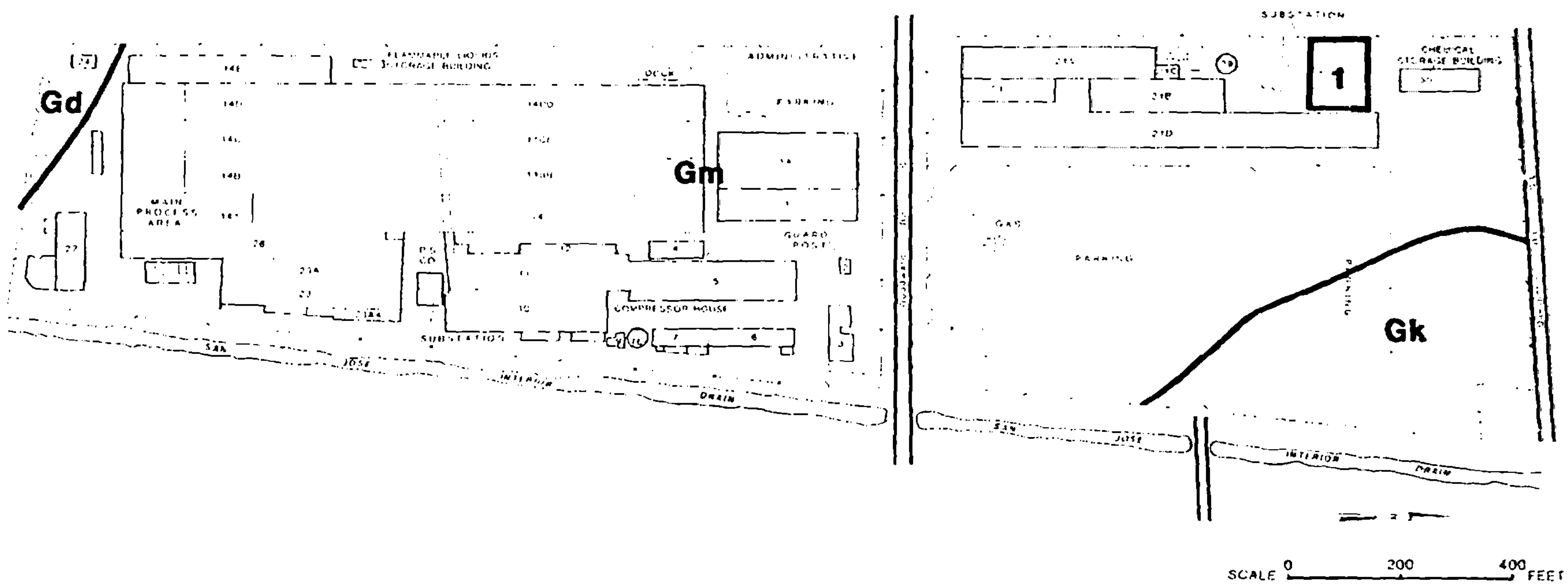
1 Actual values at plant may vary from reported vicinity values due to increased percentage of localized sand underlying the plant.

2 Severe soil limitation indicates that soil properties are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance are required.

Source: Hacker, 1977

FIGURE 3.3

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
SOILS MAP



LEGEND

Gd GILA LOAM, MODERATELY ALKALI

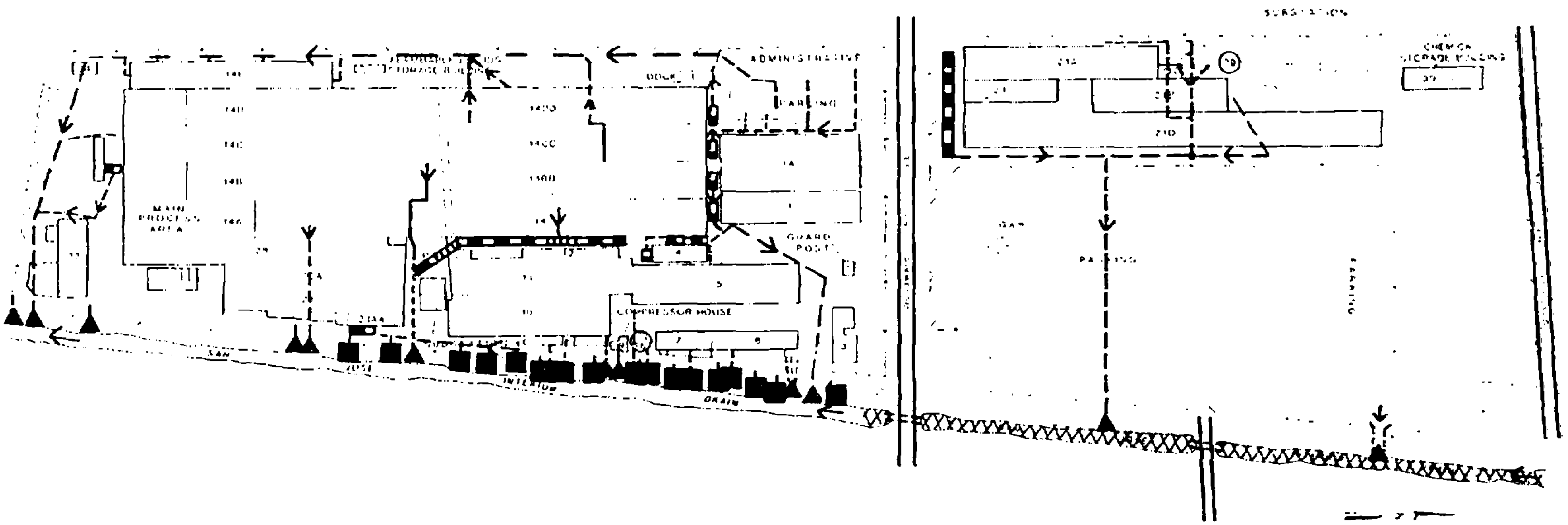
Gk GLENDALE LOAM

Gm GLENDALE CLAY LOAM

SOURCE: USDA, SCS, 1977

NOTE:
1. SANDY F' L WAS OBSERVED DURING SITE VISIT (OCTOBER 1983)

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
SURFACE DRAINAGE MAP



LEGEND

- ABOVE SURFACE DRAIN LINE
- UNDERGROUND DRAIN LINE
- SURFACE TRENCH (STEEL PLATE COVER)
- SURFACE TRENCH (GRATING COVER)
- DRAIN OUTFALL
- DRAIN OUTFALL (CLOSED) (Closed in 1978)
- DIRECTION OF DRAINAGE FLOW
- CONCRETE LINED

NOTE: SEE FIGURE 3.6 FOR OPEN DRAIN OUTFALL NUMBERS

SOURCE: USAF PLANT NO. 83 DOCUMENTS

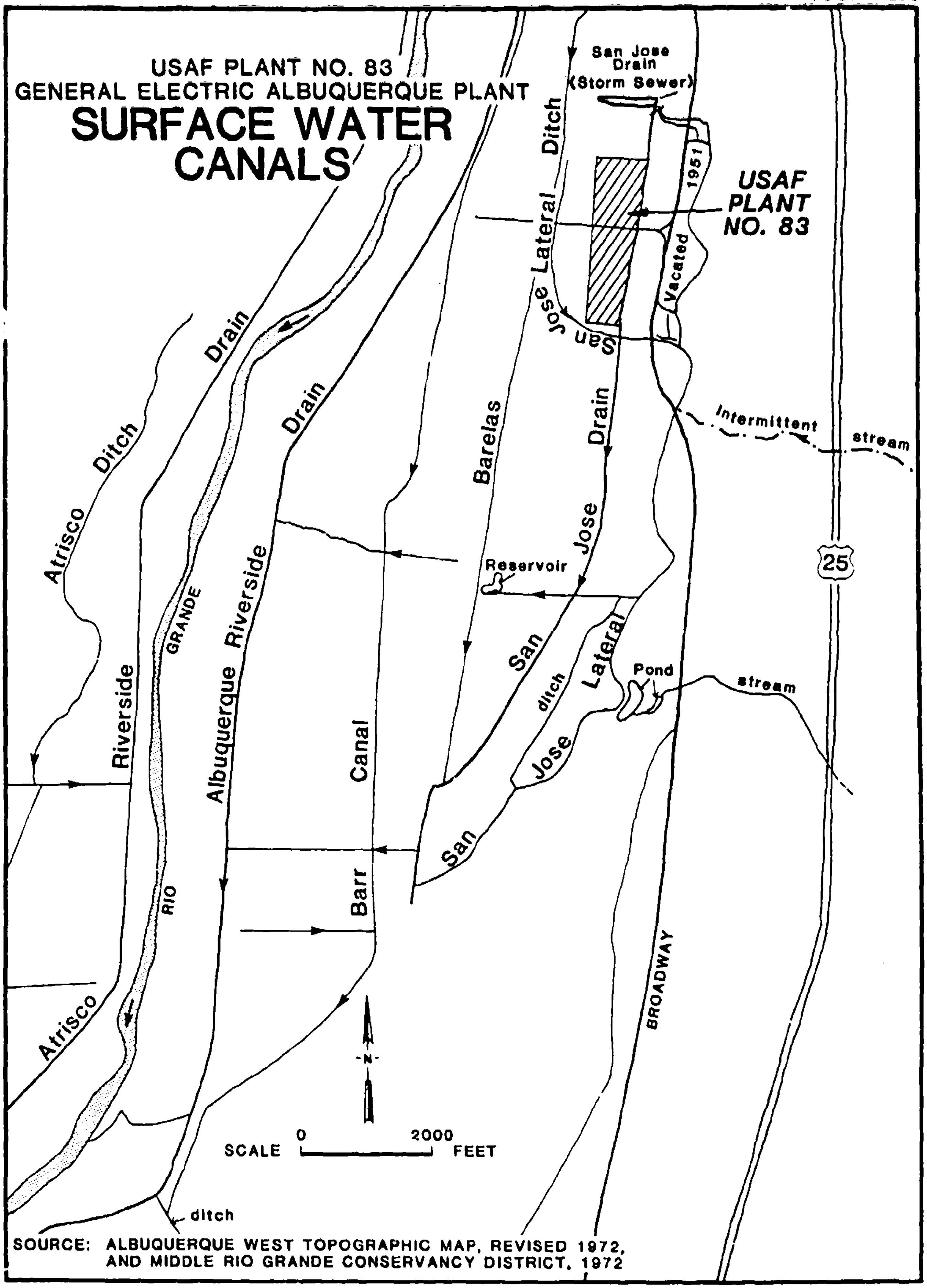
abundant vegetation. Upstream of the plant the San Jose Drain controls water flow from the San Jose Drain storm sewer catchment basin. Water in the San Jose Drain moves rapidly in the drain section south of discharge outfall numbers 004 and 005, but moves relatively slowly in the drain section north of these outfalls. Discharges from outfalls 004 and 005 near Building 10 increase the water flow south of Building 10. Within the slow moving section of the drain surface water may infiltrate to the shallow water-table aquifer. Recharge from area drainage ditches to the shallow water-table aquifer has been reported by Bjorklund and Maxwell, 1961. During the 1920's and 1930's, prior to the construction of the ditches in the area, ground water recharged the natural surface streams. The ditches were installed to lower the high ground-water levels and reduce marshy and wet areas. The San Jose Drain was installed in 1934 (Shah, 1983).

Water moving rapidly from the plant along the San Jose Drain flows south and southwest toward the Rio Grande. Figure 3.5 shows the surface-water drainage system south of the plant. Along its approximately four mile route from the plant to the Rio Grande, water from the Barelas Ditch, Barr Canal and Albuquerque Riverside Drain joins water in the San Jose Drain. Water is pumped from the San Jose Drain and other canals and ditches near the Rio Grande for irrigation purposes.

Surface-Water Quality

The general surface-water quality of the Rio Grande and local canals and drains in the Albuquerque area has been described as good, with suspended sediment the only problem (Bjorklund and Maxwell, 1961). Within Bernalillo County surface-water quality problems have been reported by Jercinovic, 1982 and McQuillian, et al., 1982. These problems were petroleum-product contamination and nitrate contamination within canals and drainage ditches.

In the immediate vicinity of the plant the New Mexico Environmental Improvement Division (NMEID) obtained two grab water samples from the San Jose Drain downstream from the plant (McQuillian, et al., 1982). The location is shown on Figure 3.6. Trace amounts of three organic contaminants were found. These contaminants were trichloromethane, 1,2-dichloroethane and 1,1,1-trichloroethane (Table 3.3). The highest concentration of 1,2-dichloroethane was 0.002 mg/l which is well below



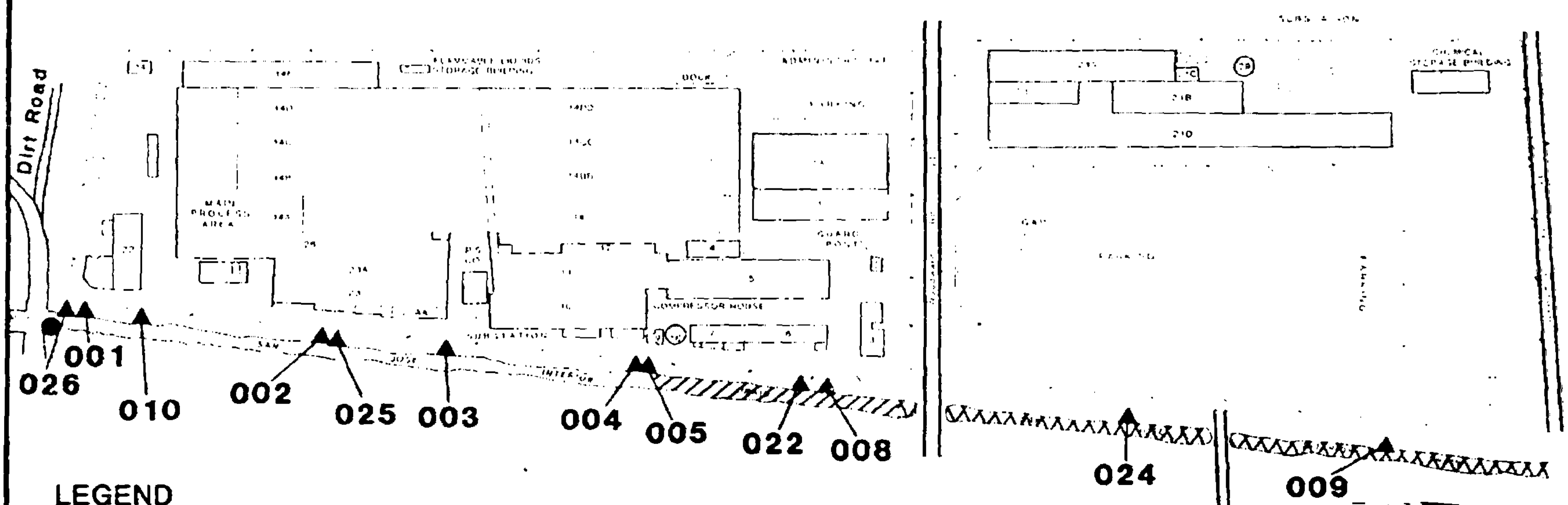
SOURCE: ALBUQUERQUE WEST TOPOGRAPHIC MAP, REVISED 1972, AND MIDDLE RIO GRANDE CONSERVANCY DISTRICT, 1972

FIGURE 3.6

USAF PLANT NO. 83

GENERAL ELECTRIC ALBUQUERQUE PLANT

SURFACE-WATER QUALITY SAMPLING LOCATIONS



LEGEND

▲ SURFACE-WATER QUALITY SAM... LOCATION (NPDES STATIONS WI... ...MBER)

● SURFACE-WATER QUALITY SAMPLING LOCATION (NMEID)

CONCRETE LINED

STREAM SEGMENT OF LOW WATER FLOW

SOURCE: USAF PLANT NO. 83 DOCUMENTS

NOTE: SEE TABLE 3.3 FOR WATER-QUALITY DATA

the NMWQCC Human Health Standard of 0.02 mg/l. There are no standards for trichloromethane or 1,1,1-trichloroethane. The source of these three organic contaminants has not been identified. No sampling of the San Jose Drain upstream of the plant was conducted at the time of the downstream sampling.

Water quality sampling of the twelve water discharge outfall points into the San Jose Drain are conducted by the plant (Figure 3.6). These twelve discharge points are sampled according to the National Pollutant Discharge Elimination System (NPDES). The results of recent sampling are shown in Table 3.3. The allowable discharge limits for oil and grease has been exceeded on six occasions while the allowable discharge for chemical oxygen demand has been exceeded on five occasions. The stations at which these excesses were detected were station numbers 001, 002, 003, 008 and 010. The station at which the most excess occurred was station number 003 on August 1, 1983.

Surface-Water Use

The surface water of the Albuquerque area is used mainly for irrigation purposes. The Middle Rio Grande Conservancy District maintains the ditches, canals and drains for irrigation uses as well as for drainage and flood control. Water flow control gates are controlled by the District to allow farmers to use their allocated amounts of water. Other uses of surface water include limited warm water fishery, livestock and wildlife watering and secondary contact recreation.

The plant discharges its storm water and NPDES permitted waters into the San Jose Drain. Municipal type waste water is discharged into the Albuquerque sewage system. The waste water treatment facility is located approximately one mile northwest of the plant on the Rio Grande. No problems have been noticed by Albuquerque from the plant's discharge into the city waste water treatment facility (Holley, 1983).

GROUND-WATER RESOURCES

The ground-water resources of the Albuquerque area are generally abundant and are of good quality except in deposits less than 100 feet deep. Reports by Bjorklund and Maxwell (1961), Reeder, et al. (1967), New Mexico State Engineer (1974), Albuquerque District, U.S. Army Corps of Engineers (1979), McQuillan, et al. (1982), McQuillan (1982) and

TABLE 3.3
SURFACE-WATER QUALITY DATA
USAF PLANT NO. 83

(Parameter analyses are presented in milligrams per liter)

Station Identification	Date (mn-dy-yr)	pH (su) (6.0-9.0)[1]	Oil and Grease (15)[1]	COD (100)[1]	TOC (Sparged) (50)[1]	Trichoromethane	1,2-Dichloroethane (0.02)[2]	1,1,1-Trichloroethane	Benzene (0.01)[2]
San Jose Drain (NMEID)	9/15/82	NA	NA	NA	NA	0.002	0.002	0.007	ND
San Jose Drain (NMEID)	9/21/82	NA	NA	NA	NA	ND	ND	0.001	ND
001 (NPDES)	9/1/82[3]	8.0	ND	ND	NA	(Not analyzed in NPDES sampling)			
	1/1/83	8.3	7	125 *	NA				
	2/1/83	8.0	ND	39	NA				
	3/1/83	7.8	ND	25	NA				
	5/1/83	8.1	82 *	334 *	NA				
	6/1/83	7.8	ND	ND	NA				
	7/1/83	7.7	ND	ND	NA				
	8/1/83	7.1	2	ND	NA				
002	5/1/83	7.1	70 *	197 *	NA				
003	9/1/82	8.4	ND	ND	NA				
	1/1/83	8.2	1	30	NA				
	2/1/83	7.9	ND	39	NA				
	3/1/83	8.2	28 *	ND	NA				
	5/1/83	8.7	ND	26	NA				
	6/1/83	8.5	ND	ND	NA				
	7/1/83	8.1	ND	25	NA				
	8/1/83	7.2	560 *	1330 *	NA				
004	9/1/82	7.6	ND	ND	NA				
	1/1/83	7.8	ND	NA	2				
	2/1/83	7.8	ND	NA	4				
	5/1/83	7.9	ND	NA	1				
	6/1/83	7.7	ND	NA	4				
	7/1/83	7.6	ND	NA	ND				
	8/1/83	7.3	ND	NA	ND				
005	9/1/82	7.6	ND	ND	NA				
	1/1/83	7.8	ND	NA	2				

Notes:
1. NPDES maximum permit requirements
2. New Mexico Water Quality Control Commission Regulations, Human Health Standards for Ground Water (no standards for other organics listed). Standards listed are for present and potential future use of ground water as domestic and agricultural water supply.
3. Period lasting through month indicated; maximum values reported.

See Figure 3.6 for station locations

ND = None detected
NA = Not analyzed
mn-dy-yr = month-day-year
su = standard units

Sparged: A chemical analysis procedure in which an air diffuser is used to create large bubbles.

*Analyses in which standards have been exceeded.

Source: USAF Plant No. 83 documents and McQuillan, et al., 1982.

TABLE 3.3 (Continued)

SURFACE-WATER QUALITY DATA
USAF PLANT NO. 83

(Parameter analyses are presented in milligrams per liter)

Station Identification	Date (mn-dy-yr)	pH (su) (6.0-9.0)[1]	Oil and Grease (15)[1]	COD (100)[1]	TOC (Sparged) (50)[1]	Trichoromethane	1,2-Dichloroethane (0.02)[2]	1,1,1-Trichloroethane	Benzene (0.01)[2]
005 (continued)	2/1/83	7.8	2	NA	2				
	5/1/83	7.9	ND	NA	1				
	6/1/83	7.7	ND	NA	8				
	7/1/83	7.6	1.4	NA	1				
	8/1/83	7.3	ND	NA	ND		(Not analyzed in NPDES sampling)		
008	3/1/83	7.0	4	370 *	NA				
009	(NO WATER DISCHARGE FROM 1/1/83 TO 8/1/83)								
010	1/1/83	7.1	70 *	NA	NA				
	3/1/83	7.0	27 *	NA	NA				
022	5/1/83	8.2	ND	NA	NA				
	6/1/83	7.5	4	NA	NA				
024	9/1/82	8.4	ND	0	NA				
	1/1/83	8.2	2	NA	NA				
	2/1/83	8.3	ND	NA	NA				
	3/1/83	8.5	ND	NA	NA				
	5/1/83	8.2	3	NA	NA				
	6/1/83	8.2	ND	[illegible]	NA				
	7/1/83	7.6	1	NA	NA				
	8/1/83	7.9	2	NA	NA				
025	9/1/82	7.2	0	0	NA				
	(NO WATER DISCHARGE FROM 1/1/83 TO 8/1/83)								
026	(NO WATER DISCHARGE ON 9/1/82 NOR FROM 1/1/83 TO 8/3/83)								

Notes: 1. NPDES maximum permit requirements
2. New Mexico Water Quality Control Commission Regulations, Human Health Standards for Ground Water (no standards for other organics listed). Standards listed are for present and potential future use of ground water as domestic and agricultural water supply.
3. Period lasting through month indicated; maximum values reported.

See Figure 3.6 for station locations

ND = None detected
NA = Not analyzed
mn-dy-yr = month-day-year
su = standard units

Sparged: A chemical analysis procedure in which an air diffuser is used to create large bubbles.

*Analyses in which standards have been exceeded.

Source: USAF Plant No. 83 documents and McQuillan, et al., 1982.

Hudson (1982) describe the ground-water resources of the area. Studies by the U.S. Geological Survey (USGS) and the U.S. Environmental Protection Agency (EPA) are in-progress and are related to the generally designated area of "known and suspected ground-water pollution by organic compounds in the San Jose area of the South Valley of Albuquerque, New Mexico" (McQuillan, et al. 1982). Plant No. 83 is located in this generally designated area, the boundary of which has not been defined. Owners and occupants of Plant No. 83 have been named as one of the many potentially responsible parties of the ground-water contamination in the South Valley (Wright, 1983). The investigation of this area by EPA is being conducted under the authority of Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Some potentially responsible parties in the area have voluntarily completed an investigation or are presently investigating the ground-water conditions underlying their property. This report is Phase I of the Air Force investigation of Plant No. 83.

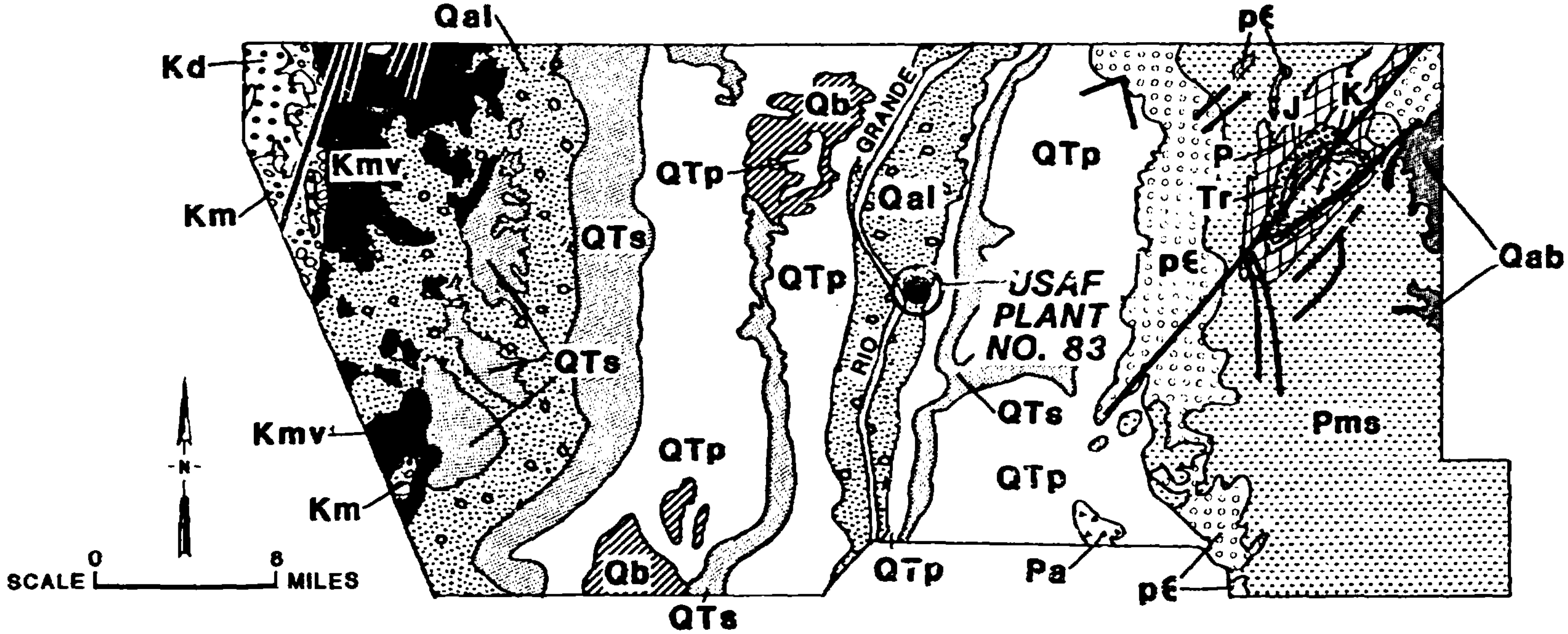
Hydrogeologic Units

Geologically, USAF Plant No. 83 is located in the outcrop area of Recent Alluvial deposits of sand, gravel, cobbles and clay. These deposits are approximately 120 feet thick underlying the plant. Other near-by geological outcrops include both unconsolidated sediments and consolidated rocks. The consolidated rocks consist of sedimentary, igneous and metamorphic units. Figure 3.7 is a geologic map of the area showing the numerous geologic outcrops while Figure 3.8 is a structural block diagram showing the approximate subsurface locations of selected geologic units. Table 3.4 summarizes the geologic units and their water-bearing characteristics. The Pediment/Santa Fe Group (undivided) are the major geologic units of concern in the area. These units are important because the City of Albuquerque withdraws its water supply from these units.

The Alluvial deposits underlying the plant have been penetrated by numerous soil test borings, three NMEID monitoring wells and two plant water wells. The log of test boring number 5 is shown on Figure 3.9. Clay is a dominant lithologic unit in this boring. Clay was also encountered by the three NMEID monitoring wells (SV8, SV9 and SV15) on the plant property. The clay is important as a semi-confining unit by

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

GEOLOGIC MAP

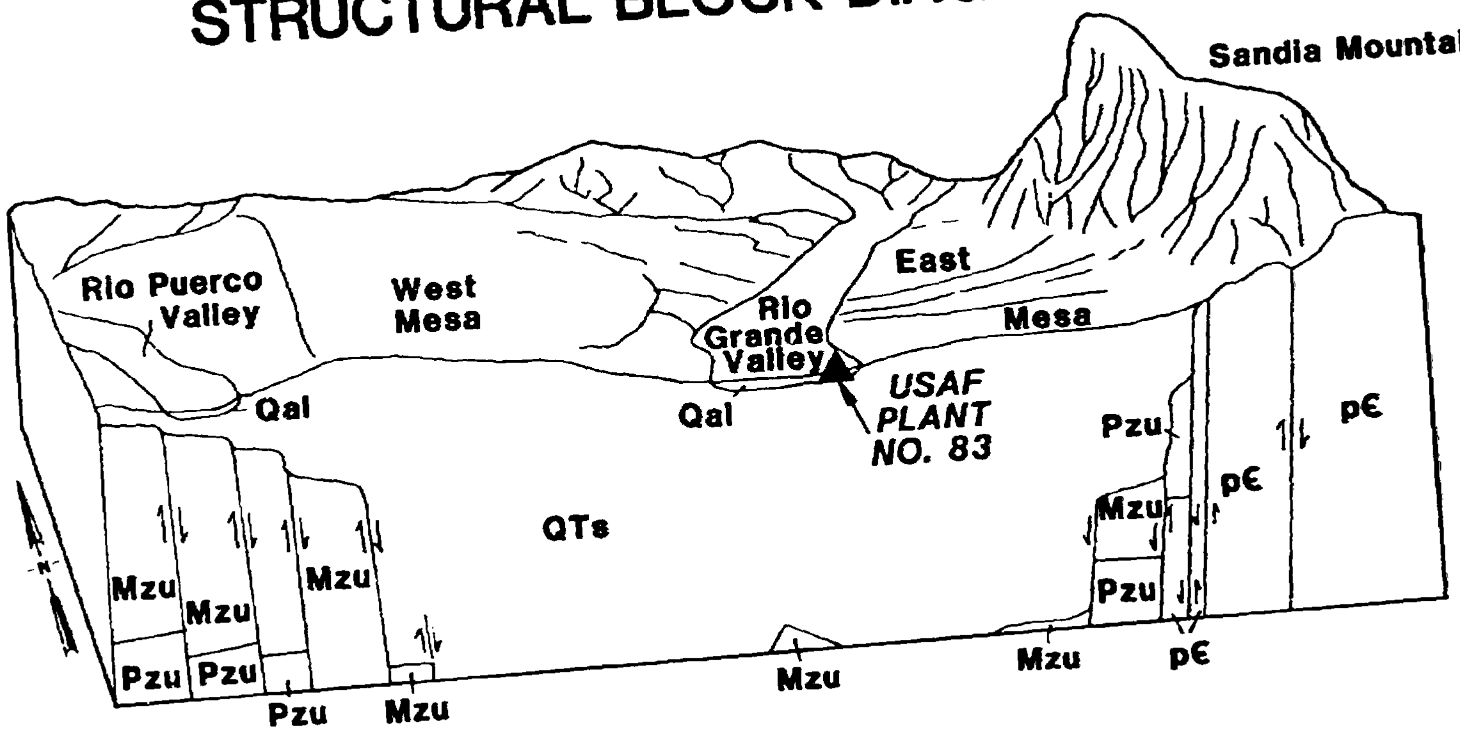


LEGEND

Qal	ALLUVIUM	Kd	DAKOTA SANDSTONE	P	PERMIAN ROCKS, UNDIVIDED
Qab	ALLUVIUM AND BOLSON DEPOSITS	Km	MANCOS SHALE	Pa	ABO SANDSTONE
Qb	BASALT FLOWS	Kmv	MESAVERDE GROUP, UNDIVIDED	Pms	MADERA LIMESTONE AND SANDIA FORMATION, UNDIVIDED
QTp	PEDIMENT	J	JURASSIC ROCKS, UNDIVIDED	pЄ	PRECAMBRIAN ROCKS, UNDIVIDED
QTs	SANTA FE GROUP, UNDIVIDED	Tr	TRIASSIC ROCKS, UNDIVIDED	—	FAULT
K	CRETACEOUS ROCKS, UNDIVIDED				

SOURCE: DANE AND BACHMAN, 1965

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
STRUCTURAL BLOCK DIAGRAM



LEGEND

Qal	ALLUVIUM	Pzu	SEDIMENTARY ROCKS, UNDIVIDED (LIMESTONE, SANDSTONE, SHALE)
QTs	SANTA FE GROUP, UNDIVIDED	pЄ	GRANITIC AND METAMORPHIC ROCKS, UNDIVIDED
Mzu	SEDIMENTARY ROCKS, UNDIVIDED (SHALE & SANDSTONE)	⇅	FAULT WITH DIRECTION OF MOVEMENT

HORIZONTAL SCALE 0 — 4 MILES

NOTE: APPROXIMATE LOCATION OF USAF PLANT NO. 83 IN ALBUQUERQUE AREA

SOURCE: BJORKLUND AND MAXWELL, 1961

TABLE 3.4
HYDROGEOLOGIC UNITS AND THEIR WATER-BEARING CHARACTERISTICS IN THE VICINITY OF USAF PLANT NO. 83

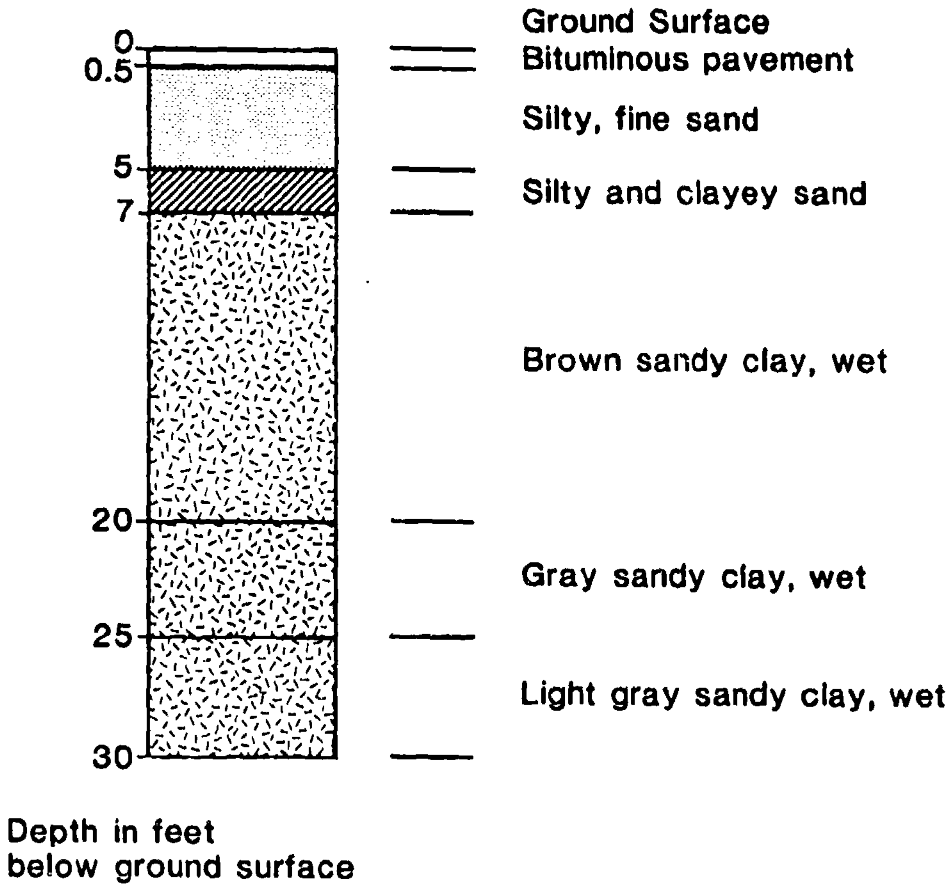
Era	System	Series	Unit	Approximate Thickness (Feet)	Hydrogeologic Classification	Dominant Lithology	Water-Bearing Characteristics
	Quaternary	Recent	Alluvium	120	Unconfined Aquifer	Sand, gravel, cobbles and clay.	Readily transmits water. Some wells yield as much as 3,000 gpm.
Cenozoic	Tertiary	Pleistocene	Pediment	>9,000	Unconfined Aquifer	Sand, gravel and caliche	Readily transmits water. Transmissivities between 50,000 and 100,000 gpd/ft are common near the Rio Grande.
		Miocene	Santa Fe Group (Undivided)			Sand, gravel and cobbles with clay. Unconsolidated to consolidated but weakly cemented.	
		Eocene	Espinaso Volcanic Rocks	1,400	Unknown	Breccia, conglomerate and tuff	No wells tap this unit because of great depth
		Eocene and Oligocene	Galisteo Formation	4,000	Unknown	Sand, clay, sandstone and shale	No wells tap this unit because of great depth.
Mesozoic	Cretaceous Jurassic Triassic	(Undivided)		7,100	Unconfined and Confined Aquifers	Sedimentary rocks	Moderately transmits water to wells on mesas and in adjoining areas.
Paleozoic	Permian Pennsylvanian	(Undivided)		5,100			
Precambrian		(Undivided)		>18,000	Unconfined and Confined Aquifers	Igneous and Metamorphic rocks	Transmits little water to wells in mountain areas.

Source: Bjorklund and Maxwell, 1961 and Dave and Bochman, 1965

gpm gallons per minute
gpd/ft gallons per day per foot

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

TEST BORING LOG NO. 5



NOTE: SEE FIGURE 3.10 FOR TEST BORING LOCATION
SOURCE: USAF PLANT NO. 83 DOCUMENTS

reducing the possible downward migration of ground water. Figure 3.10 shows the location of two hydrogeologic cross sections of the plant's subsurface. The cross sections are shown on Figures 3.11 and 3.12. Clay is most abundant in wells SV9 and SV15 underlying the middle and northern sections of the plant. Clay is thickest (5.5 feet) in well SV15 where it is present from 2.5 to 8.0 feet below ground.

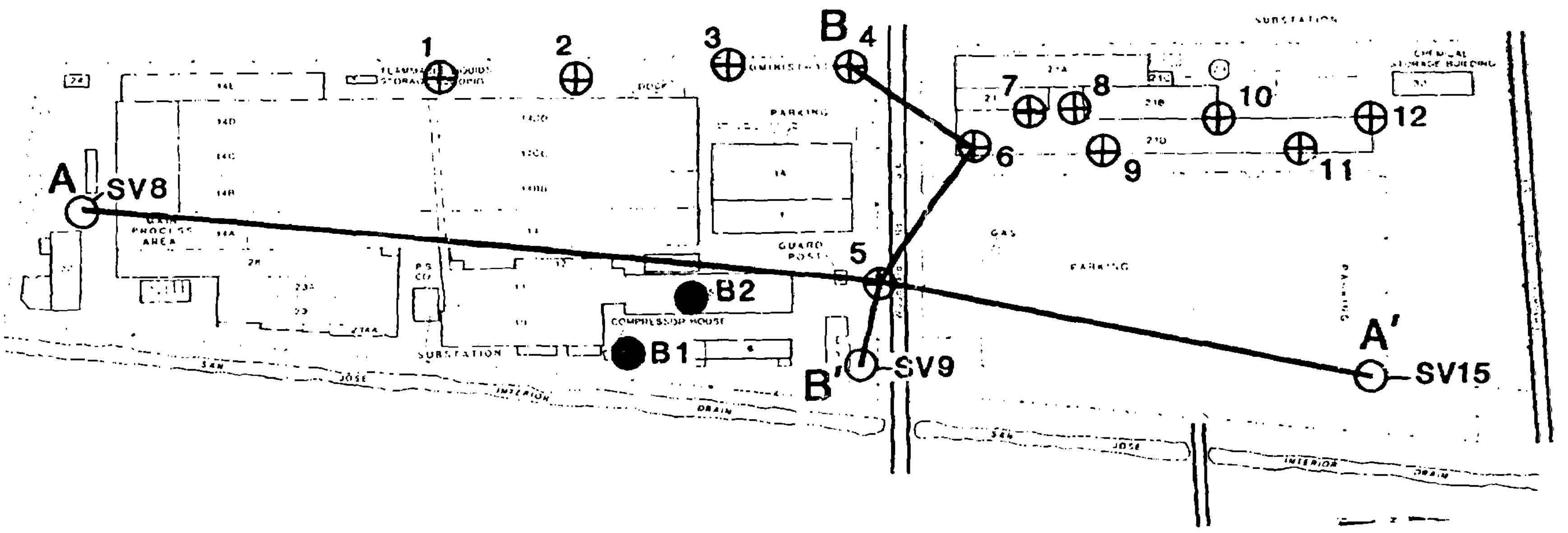
The Pediment/Santa Fe Group (undivided) which outcrop east of the plant are composed of sand, gravel and cobbles with moderate amounts of clay. Caliche, a calcium carbonate cemented zone of soil, is also present in these units near the plant as are zones of cemented sandstone.

Hydrologically, USAF Plant No. 83 is located in an area of large ground-water use. Due to the large amount of ground-water pumpage by the city of Albuquerque the once southwesterly direction of regional ground-water flow has changed to a northeasterly and easterly direction of flow. Figure 3.13 shows the 1960 configuration of the regional water table. The effects of the San Jose Well Field are not apparent in this figure, but are very apparent in Figure 3.14, the 1978 configuration of the regional water table. In 1980 major water producing wells (SJ3, SJ6 and Miles No. 1) northeast and east of the plant were shut down due to contamination. Miles No. 1 was put back on line in 1981. Figure 3.15 shows the approximate regional water-table configuration in the Spring of 1981. Due to increased pumpage from other Albuquerque wells further east and northeast of the plant the direction of regional ground-water flow remained easterly in 1981. Water-level measurements made in July 1983 by the USGS are being analyzed and will become part of a report planned for publication in the near future (Kues, 1983).

Water-level measurements made in December 1982 by the NMEID indicate that locally there exists three major hydrologic features near the plant. These features are (1) low horizontal hydraulic gradients, (2) two distinct hydrologic units and (3) ground-water leakage from the shallow water-table aquifer to the regional water-table aquifer. The first feature of low horizontal hydraulic gradients can be inferred from the water-level elevations in Figure 3.16. Wells less than 25 feet deep within the shallow water-table aquifer display water-table conditions with water-level elevations between 4919 and 4923 NGVD. The horizontal

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

LOCATION OF TEST BORINGS, WELLS, AND HYDROGEOLOGIC CROSS SECTIONS



LEGEND

⊕ TEST BORING (CONSTRUCTION FOUNDATION)

○ MONITOR WELL

● WATER SUPPLY WELL (UNUSED)

A–A′ LOCATION OF HYDROGEOLOGIC CROSS-SECTION

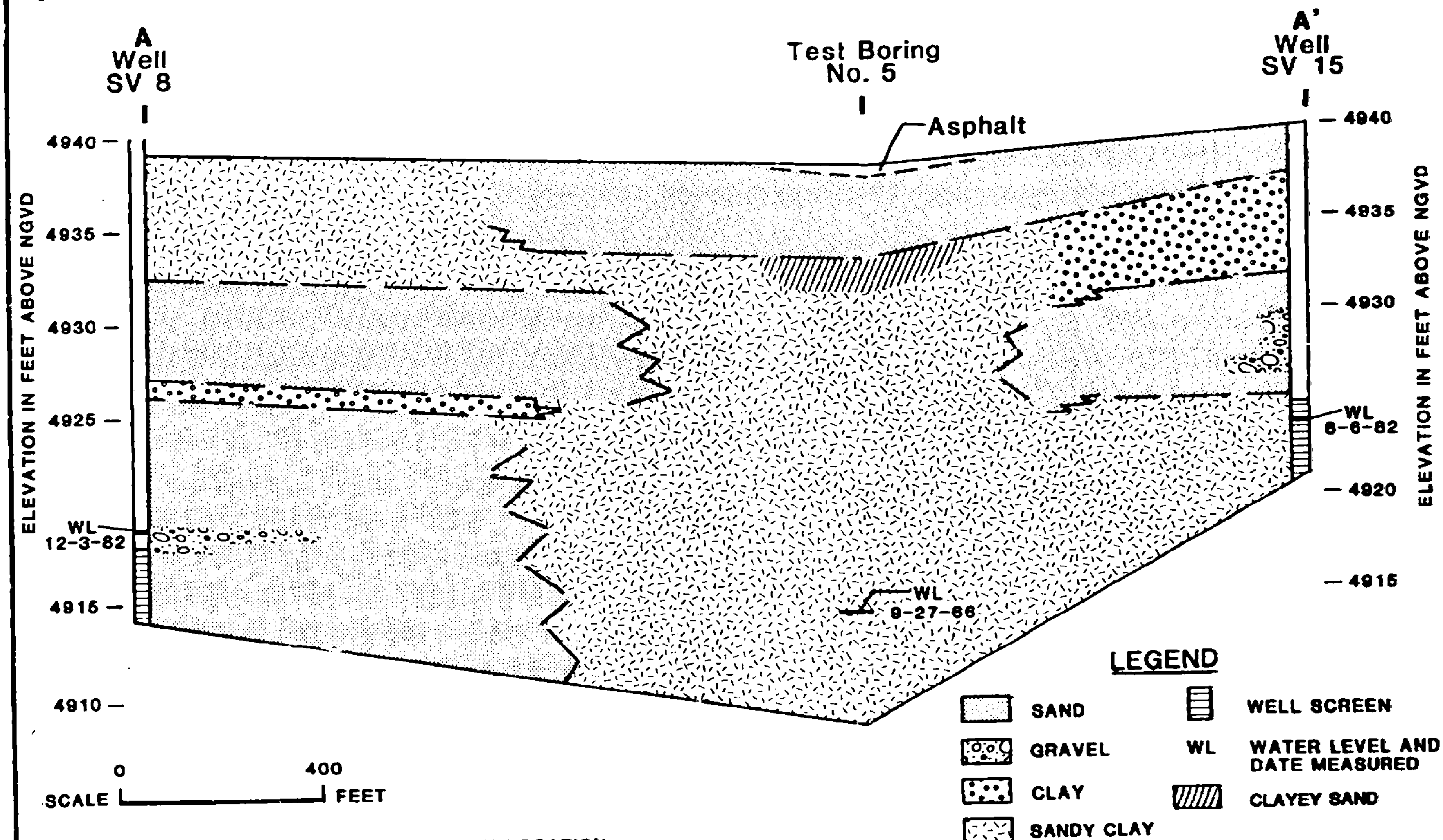
NOTE: SEE FIGURES 3.11 AND 3.12 FOR HYDROGEOLOGIC CROSS-SECTIONS

SOURCE: USAF PLANT NO. 83 DOCUMENTS AND McQUILLAN, et al., 1982

FIGURE 3.11

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

HYDROGEOLOGIC CROSS SECTION A – A′

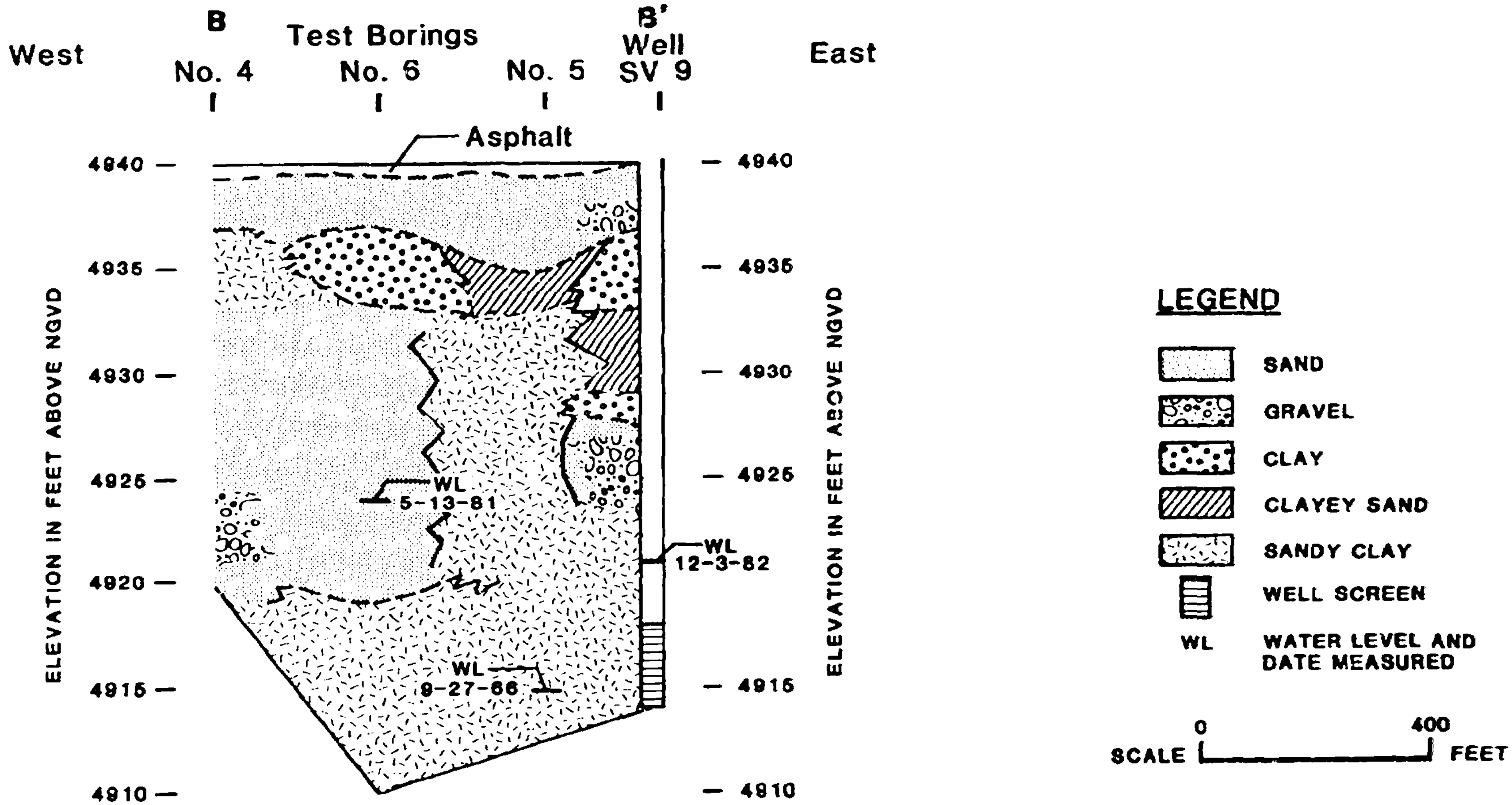


NOTE: SEE FIGURE 3.10 FOR CROSS SECTION LOCATION
SOURCE: USAF PLANT NO. 83 DOCUMENTS AND McQUILLAN, et al., 1982

FIGURE 3.12

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

HYDROGEOLOGIC CROSS SECTION B – B′

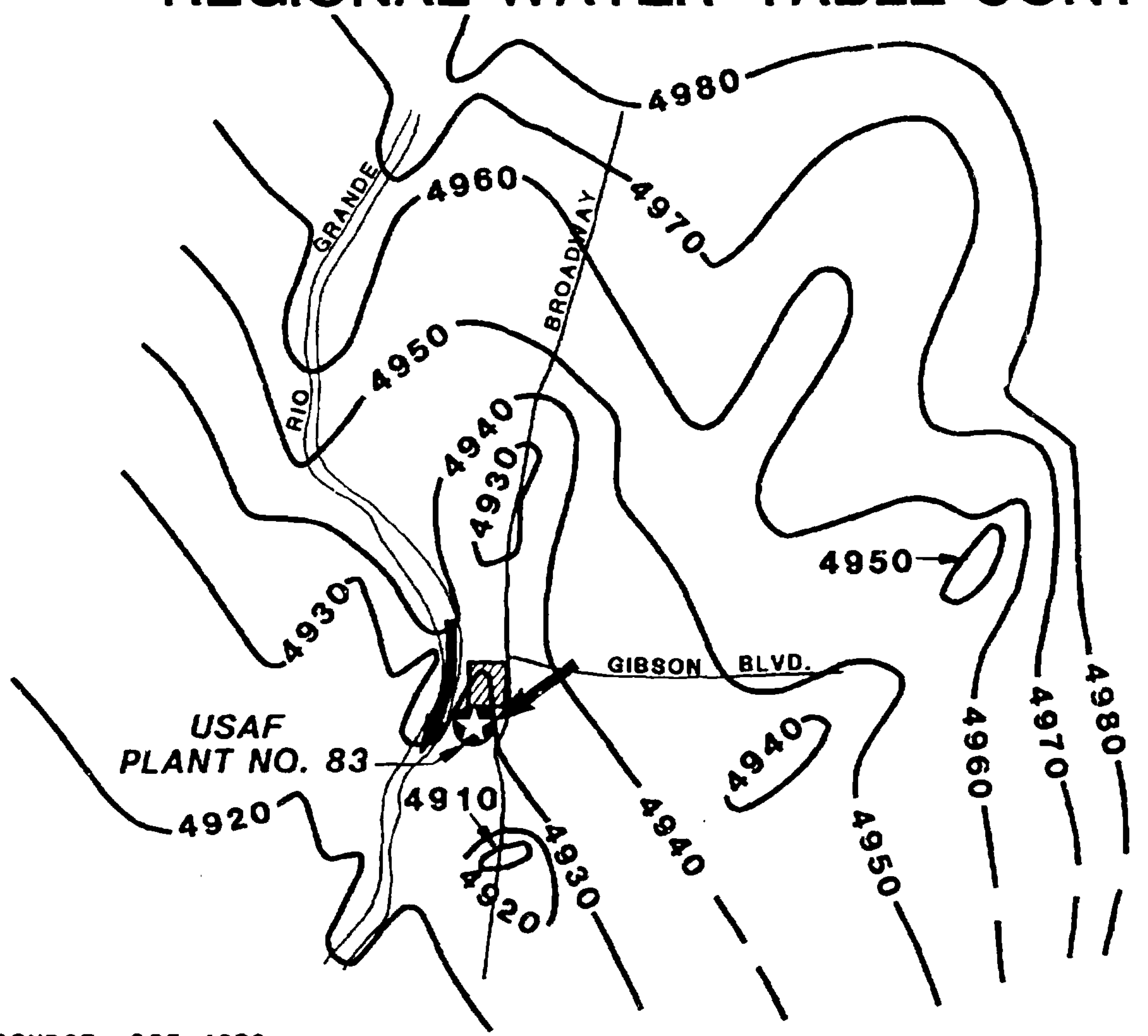


NOTE: SEE FIGURE 3.10 FOR CROSS SECTION LOCATION
SOURCE: USAF PLANT NO. 83 DOCUMENTS AND McQUILLAN, et al., 1982

FIGURE 3.13

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

REGIONAL WATER-TABLE CONTOUR MAP, 1960



LEGEND

—4910— WATER-TABLE CONTOUR

SAN JOSE WELL FIELD

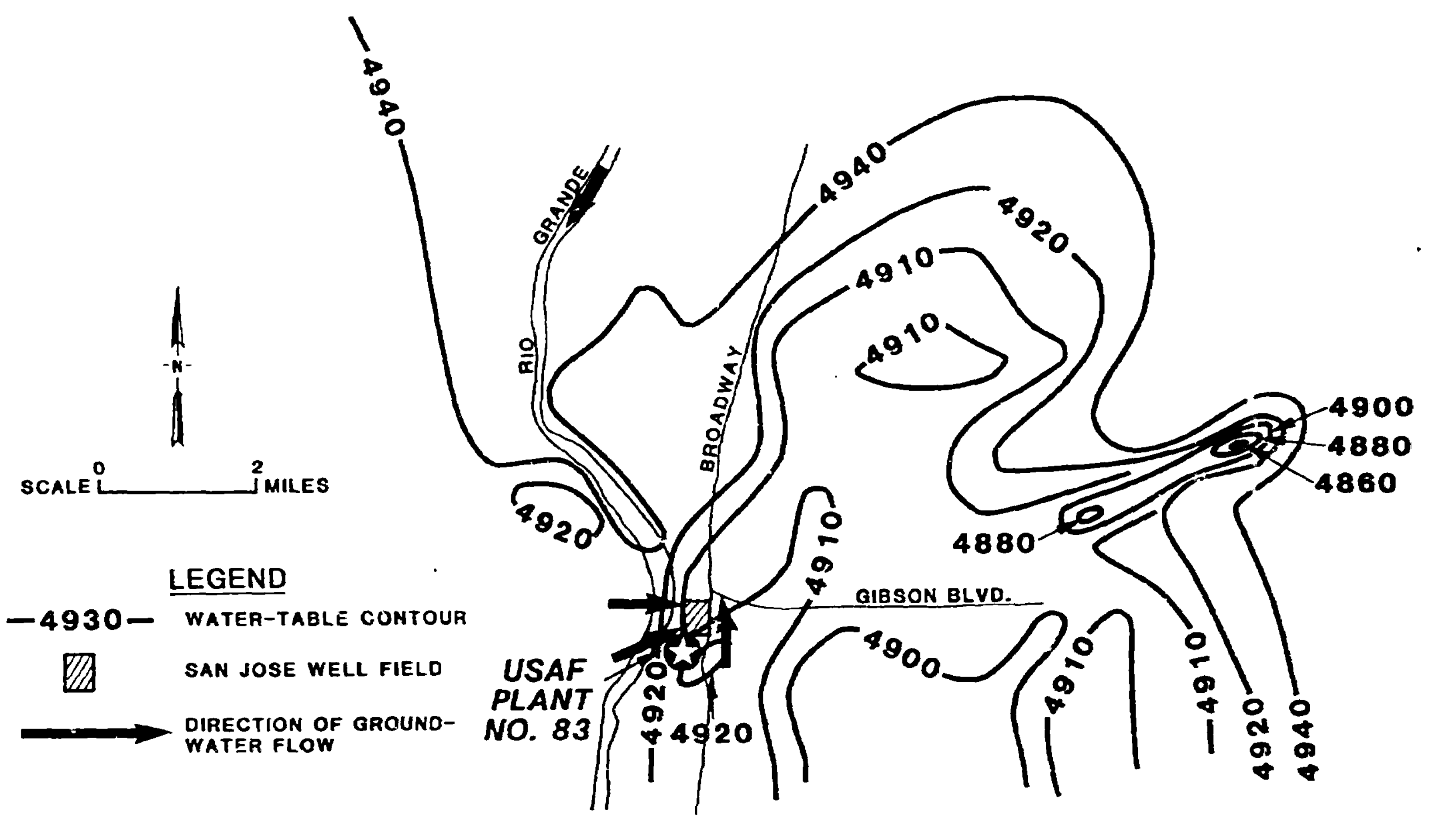
DIRECTION OF GROUND-WATER FLOW

SOURCE: COE, 1979

USAF PLANT NO. 83

GENERAL ELECTRIC ALBUQUERQUE PLANT

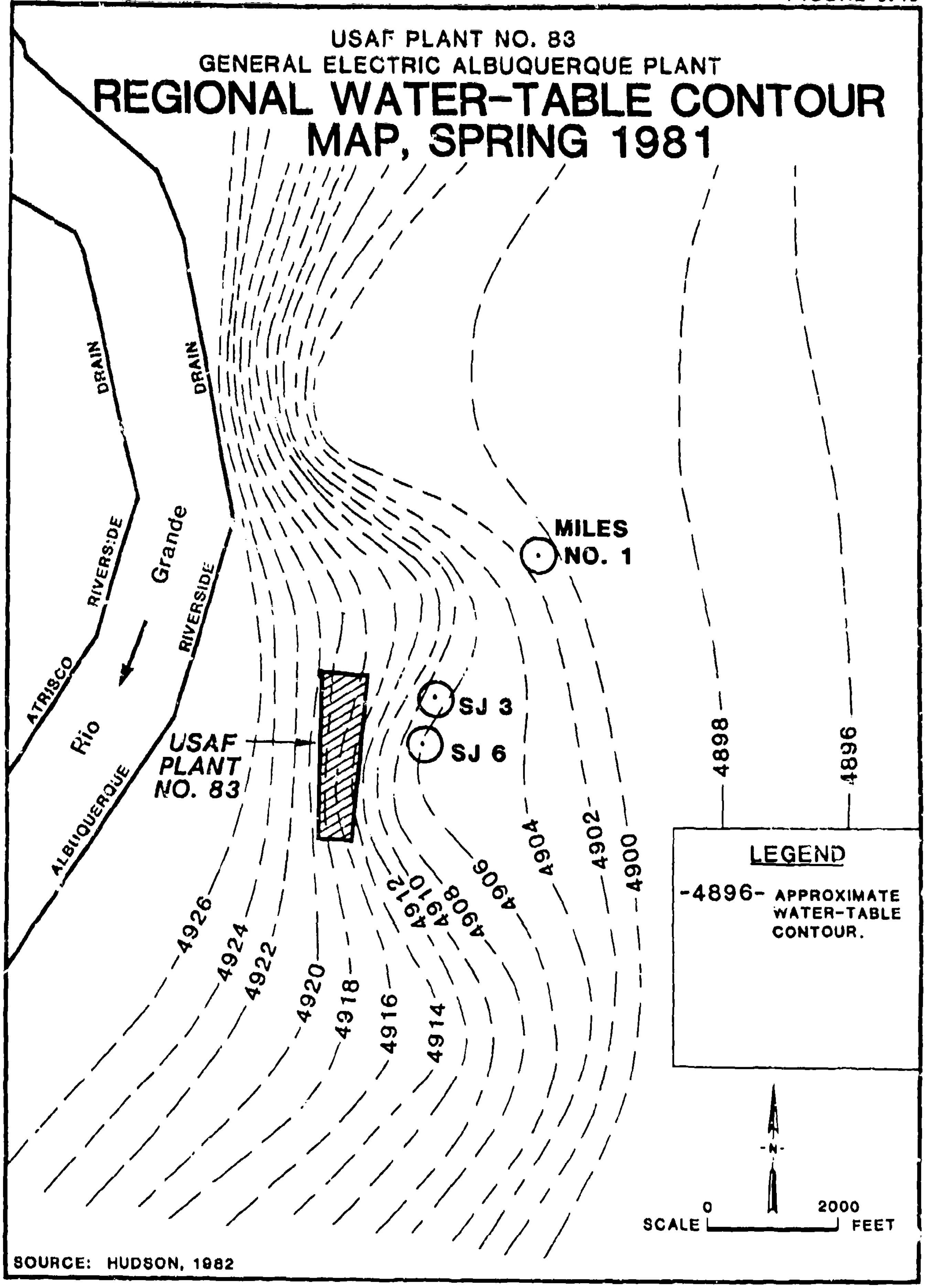
REGIONAL WATER-TABLE CONTOUR MAP, 1978



SOURCE: COE, 1978

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

REGIONAL WATER-TABLE CONTOUR MAP, SPRING 1981

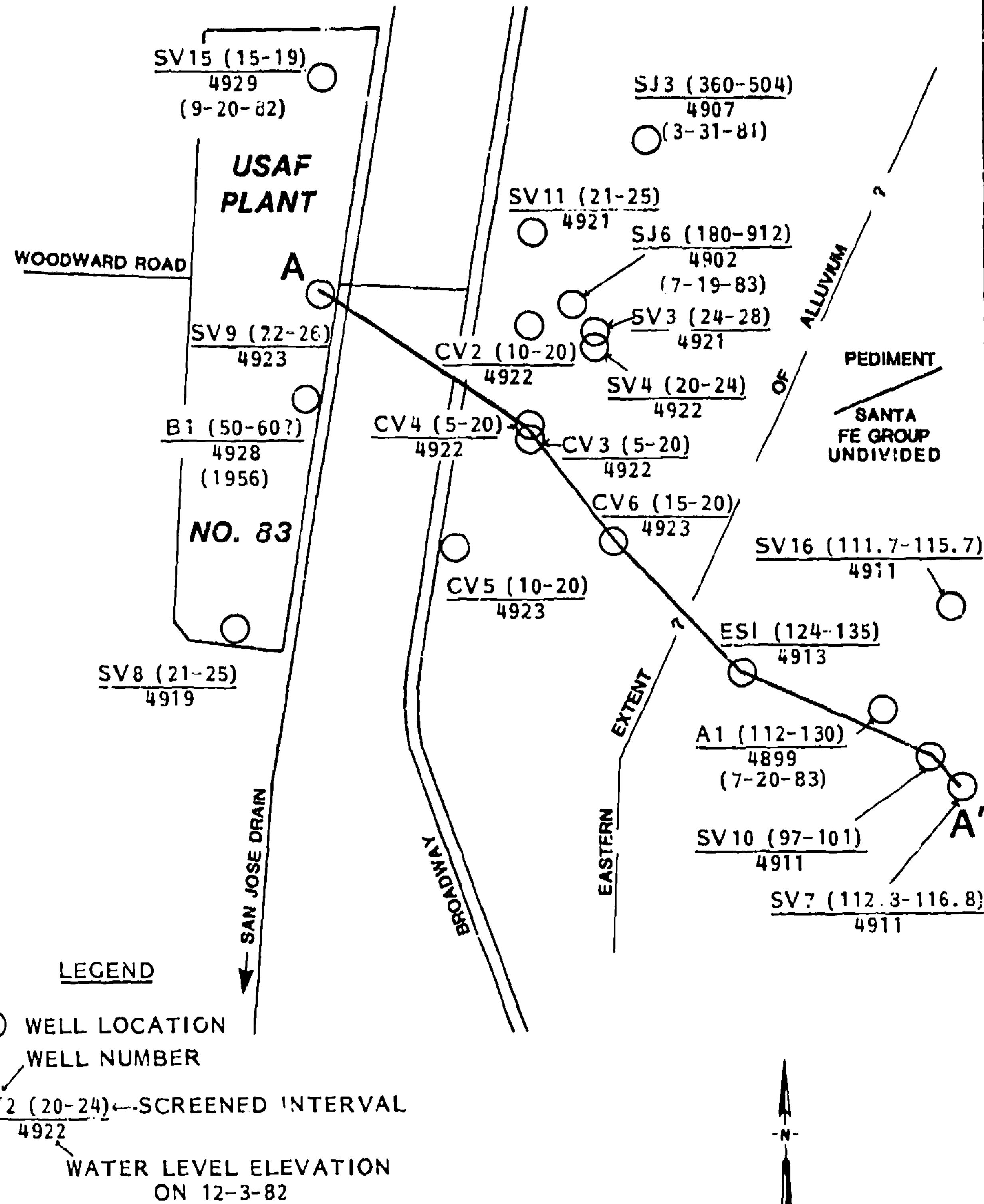


SOURCE: HUDSON, 1982

FIGURE 3.16

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

WELL CONSTRUCTION AND WATER-LEVEL DATA FOR SELECTED WELLS



NOTE: SPECIAL WATER LEVELS ARE DATED
SOURCE: McGUILLAN, ET AL., 1982, HUDSON, 1982 AND KUES, 1983

hydraulic gradient is approximately 0.002 (2 feet per 1000 feet) near the plant. These wells are on plant property and within the Alluvium. The importance of this feature is the lack of a significant hydraulic head to cause ground water in the shallow water-table aquifer to move appreciably west to east from the plant to wells SJ3 and SJ6 in the San Jose Well Field. This condition may change if SJ3 and SJ6 resume pumping.

The second feature of two distinct hydrologic units can be seen from the difference in water-level elevations east and west of the geological extent of the Alluvium. Water levels in general are approximately ten feet lower in elevation on the east than on the west of the geological boundary. This feature displayed locally by the December 1982 water levels has been mapped regionally by Bjorklund and Maxwell, 1961. Note also that the 1983 water-level elevation of well SJ6, which taps the regional water-table aquifer and has been shut down for approximately three years, is well below those of the shallower wells which are also under water-table conditions. The SJ6 water level has been affected by a continual regional water-table decline in the Albuquerque area (Corps of Engineers, 1974). The wells east of the geological boundary have water levels similar to those of wells SJ3 and SJ6 indicating good hydraulic connection between the city wells and the wells east of the geologic boundary. The feature of two distinct hydrologic units is important in that a relatively isolated shallow water-table aquifer now exists under the plant and just east of the plant where SJ3 and SJ6 are located. The shallow water-table levels have not been affected by the regional water-table decline. Prior to 1978 the two aquifers had similar water levels indicating a one-flow system. The clays mentioned earlier as being present under the plant apparently contained ground water in this shallow aquifer as the ground-water level in the regional aquifer declined. Therefore, the clays may limit the hydraulic connection between the shallow water-table aquifer and the regional water-table withdrawal zones of SJ3 and SJ6 in the deeper Santa Fe Group (undivided). This hydraulic connection may increase if SJ3 and SJ6 resume pumping.

The third feature of ground-water leakage from the shallow water-table aquifer to the regional water-table aquifer is illustrated

in Figure 3.17. The cross-section location shown in Figure 3.17 is located on Figure 3.16 from well SV9 on the plant property to well SV7 southeast of the plant. Leakage of ground water may occur vertically down from the shallow water-table aquifer in the shallow Alluvium to deeper alluvial deposits and the Santa Fe Group (undivided). Although the water level measurement dates differ for the two aquifers, historical water level data indicates that the vertical migration potential has existed at the plant since 1978. These facts are important in that ground water directly underlying the plant may migrate vertically to the deeper alluvial deposits and Santa Fe Group (undivided), although the low permeability of the underlying clays would tend to limit vertical ground-water leakage. Data presently available does not allow the complete evaluation of the leakage potential.

Two other important concerns in terms of leakage and recharge are the facts that the San Jose Drain recharges the shallow water-table aquifer and that the Rio Grande being controlled by levees and canals is approximately eight feet above the shallow water-table (Bjorklund and Maxwell, 1961). The Rio Grande also recharges the shallow water-table aquifer.

Ground-Water Quality

Ground-water quality in the vicinity of the plant has been investigated by McQuillan, et. al. 1982 and numerous potentially responsible parties named as possible contributors to the ground-water contamination in the South Valley of Albuquerque. Investigations in the general Rio Grande Valley of Albuquerque have documented ground-water contamination by nitrate from septic tanks, agricultural facilities, dumpsites and nitrate-contaminated surface water (McQuillan, 1982). Contamination by petroleum products from service station gasoline tanks and bulk fuel facilities has also been documented by McQuillan.

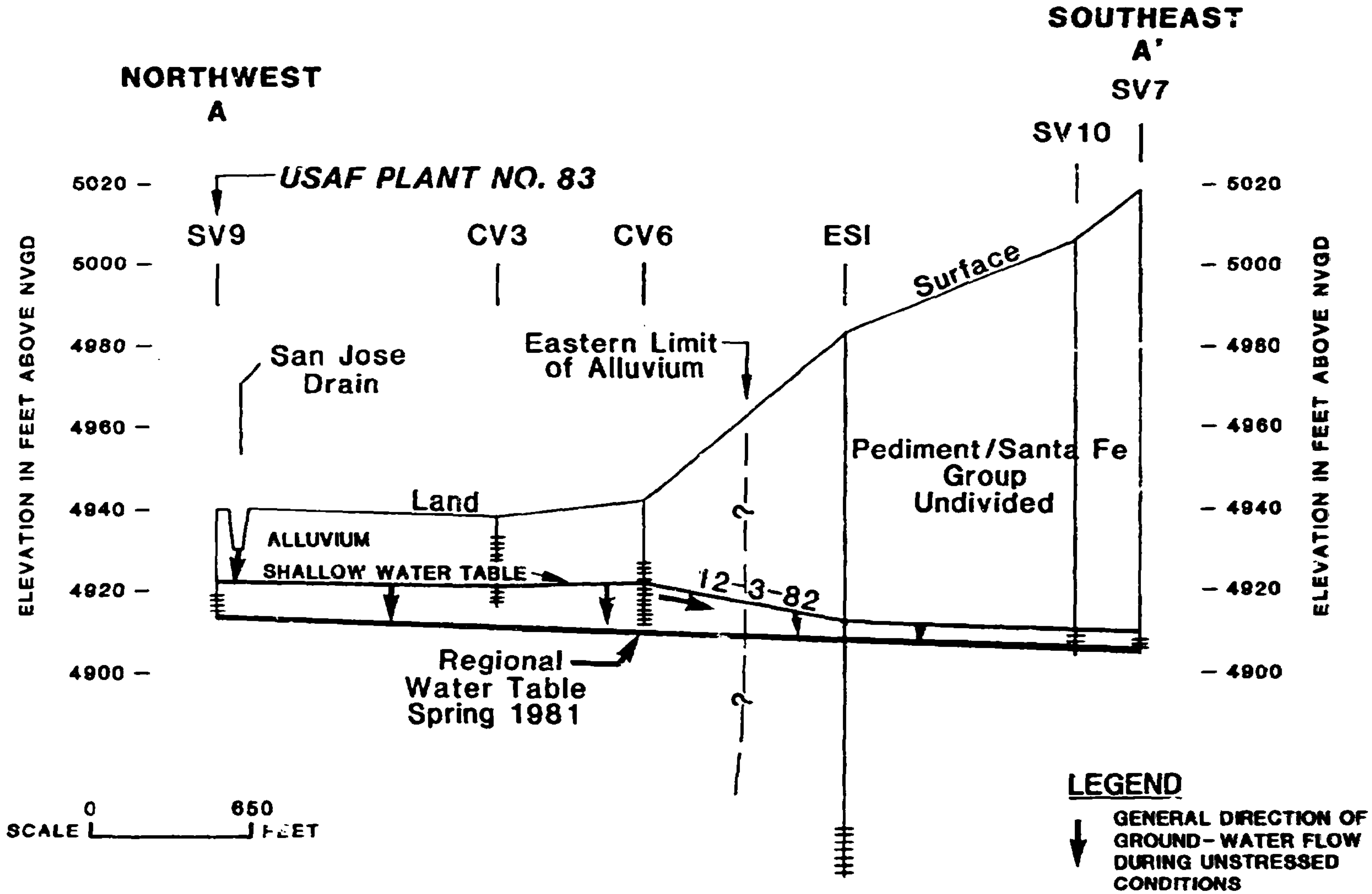
Plant No. 83 is located in the South Valley where wells SJ3 and SJ6 continue to be shut down due to organic contamination. Other wells which have been shut down due to past contamination problems are A1, C1 and ESI. Figure 3.18 illustrates the ground-water contamination problem in the vicinity of the plant. Seven wells in the area have ground water in which organic contaminants have exceeded the NMWQCC Human Health

FIGURE 3.17

USAF PLANT NO. 83

GENERAL ELECTRIC ALBUQUERQUE PLANT

VICINITY HYDROLOGIC CROSS SECTION



NOTE: SEE FIGURE 3.16 FOR CROSS SECTION LOCATION

SOURCE: McQUILLAN, et al., 1982 AND HUDSON, 1982

Standards. More varied organic contaminants in significantly higher concentrations have been detected in deeper monitoring wells in the area east of the vacated San Jose Lateral than in the vicinity of the plant. Table 3.5 summarizes significant ground-water quality analyses in the area. Appendix C-1 summarizes additional ground-water quality data for the area. The only organic contaminant which can be compared to a standard was found in shallow well SV15 underlying the plant. A concentration of 0.009 mg/l 1,1-Dichloroethene was sampled on September 8, 1982. This concentration is 0.004 mg/l over the NMWQCC Human Health Standard of 0.005 mg/l. Other organic contaminants in trace amounts detected at the plant monitoring wells were the following:

Well	Contaminant
SV8	1,1,2,2-Tetrachloroethane
SV9	1,2-Dichloroethane
	1,1,1-Trichloroethane
	Tetrachloroethene
SV15	1,1-Dichloroethane
	1,1,1-Trichloroethane
	Trichloroethene

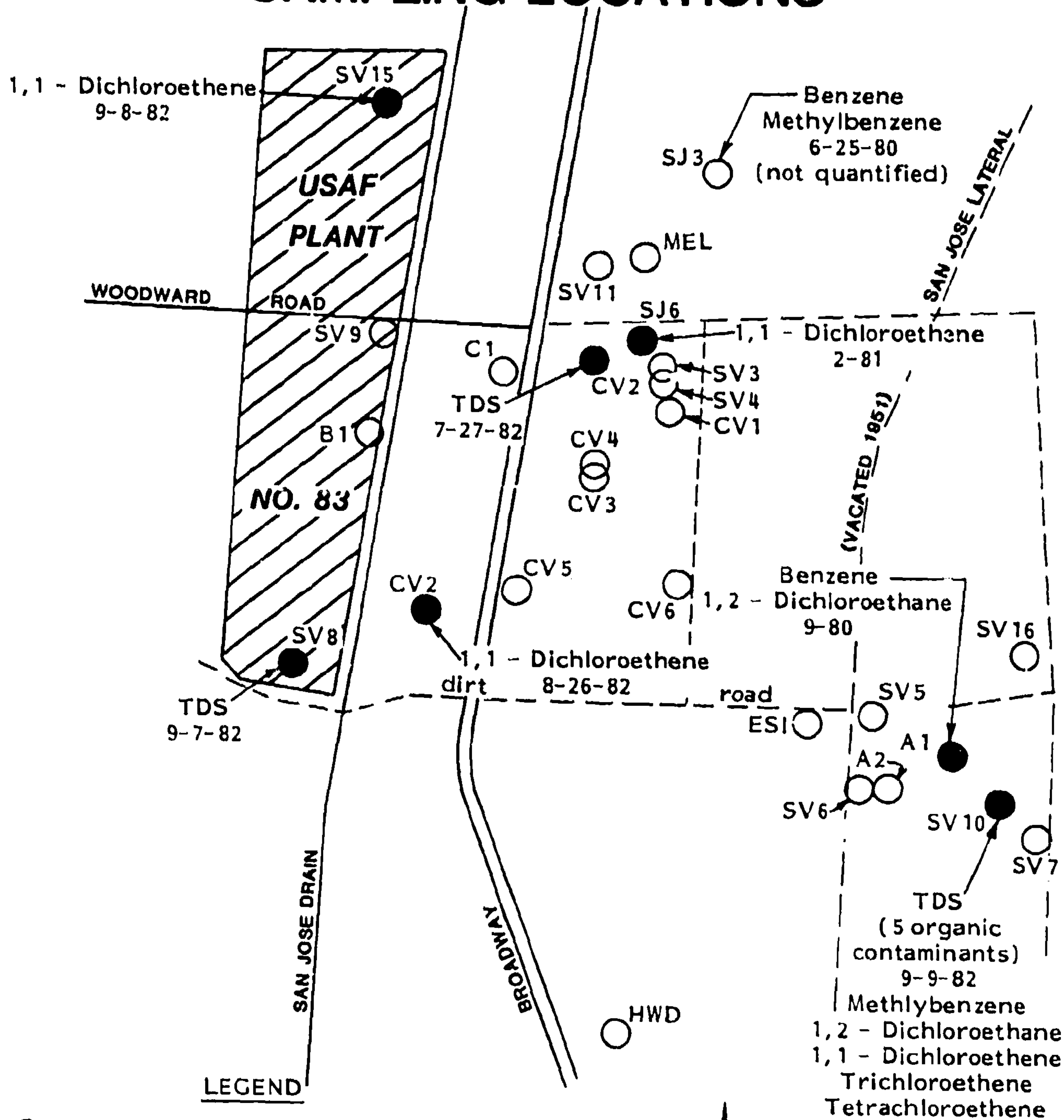
Metal contaminants were also detected in the shallow plant monitoring wells. Metals which exceeded the MNWQCC Human Health Standards were arsenic, barium, total chromium and lead. Of these contaminants, 1,1,1-Trichloroethane, chromium, and lead are the only materials which have been utilized in significant quantities at the plant. Wells tapping the regional water-table aquifer underlying the plant have not been installed. The sources of the contaminants within the shallow water-table aquifer have not been identified.

Ground-Water Use

Ground water in the Aubuquerque area is the only source of public water supply at the present time. Due to the importance of ground water the Rio Grande Basin has been officially designated as a "declared underground water basin" (New Mexico State Engineer, 1974). The basin ground water is regulated as a sole source of potable water. There are eighteen water supply well fields operated by the City of Albuquerque. The San Jose Well Field is near the plant as shown in Figure 3.19. Only

FIGURE 3.18

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
GROUND-WATER QUALITY SAMPLING LOCATIONS



LEGEND

○ SAMPLING WELL LOCATION

● WELL LOCATION WHERE WATER QUALITY STANDARDS HAVE BEEN EXCEEDED BY PARAMETER AND DATE.

NOTE: SEE TABLE 3.5 AND APPENDIX C-1 FOR ANALYSES

SOURCE: McQUILLAN, et al., 1982

TABLE 3.5

SELECTED GROUND-WATER QUALITY DATA
FOR USAF PLANT NO. 83 AND VICINITY

(Parameter analyses are presented in milligrams per liter)

Well Identification	Date (mn-dy-yr)	Chloride [1] (250)	Total Dissolved Solids (1000)	Benzene (0.01)	Methyl-benzene (0.01)	Tetra-chloro-methane (0.01)	1,2-Dichloro-ethane (0.02)	1,1-Dichloro-ethene (0.005)	Trichloro-ethene (0.1)	Tetra-chloro-ethene (0.02)	Acetone (NS)	Methyl Ethyl Ketone (NS)
A1, Amerigas Well	7-23-80	NA	NA	ND	ND	ND	0.097	ND	ND	<0.001	NA	NA
B1, Plant No. 83, Well No. 2	2-25-82	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA
C2, Texaco Well	8-26-82	41.3	576	ND	ND	ND	0.0006	0.011	0.019	0.001	NA	NA
CV2, Chevron Monitor Well	7-27-82	54.7	2219	NA	NA	NA	NA	NA	NA	NA	NA	NA
HWD, New Mexico Hwy. Dept. Well	9-15-82	126.49	862	ND	ND	ND	ND	ND	ND	ND	ND	ND
MEL, Melchor Well	4-01-82	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA
SJ3, Albuquerque City Well	6-25-80	36	329	DNQ	DNQ	ND	ND	ND	ND	ND	ND	ND
[2]SJ6, Albuquerque City well	6-25-80	33	300	DNQ	DNQ	ND	ND	DNQ	DNQ	DNQ	ND	ND
SV5, NMEID Monitor Well	9-17-82	NA	NA	ND	ND	ND	ND	ND	0.0057	0.003	NA	NA
SV7, NMEID Monitor Well	8-25-82	9.2	171	ND	ND	ND	0.006	0.005	0.002	0.001	NA	NA
[2]SV8, NMEID Plant No. 83	9-07-82	98.8	1517	ND	ND	ND	ND	ND	ND	ND	NA	NA
[2]SV9, NMEID Plant No. 83	9-08-82	39.5	507	ND	ND	ND	0.0015	ND	ND	0.0018	NA	NA
[2]SV10, NMEID Monitor Well	9-09-82	2462	7066	ND	0.6	ND	1.7	9.0	6.0	20.0	150.0	6.0
[2]SV15, NMEID Plant No. 83	9-08-82	37.3	874	ND	ND	ND	ND	0.009	0.0006	ND	NA	NA

NOTES: 1 New Mexico Water Quality Control Commission Human Health Standards
2. See Appendix C-1 for additional water quality data.
See Figure 3.18 and 3.20 for well locations.
See Table 3.6 for well construction data.

NS = No Standard
ND = Not detected
NA = Not analyzed
DNQ = Detected but not quantified
NMEID = New Mexico Environmental Improvement Division

Source: USGS, 1981, McQuillan, et al., 1982, and Wilson Laboratories, 1982

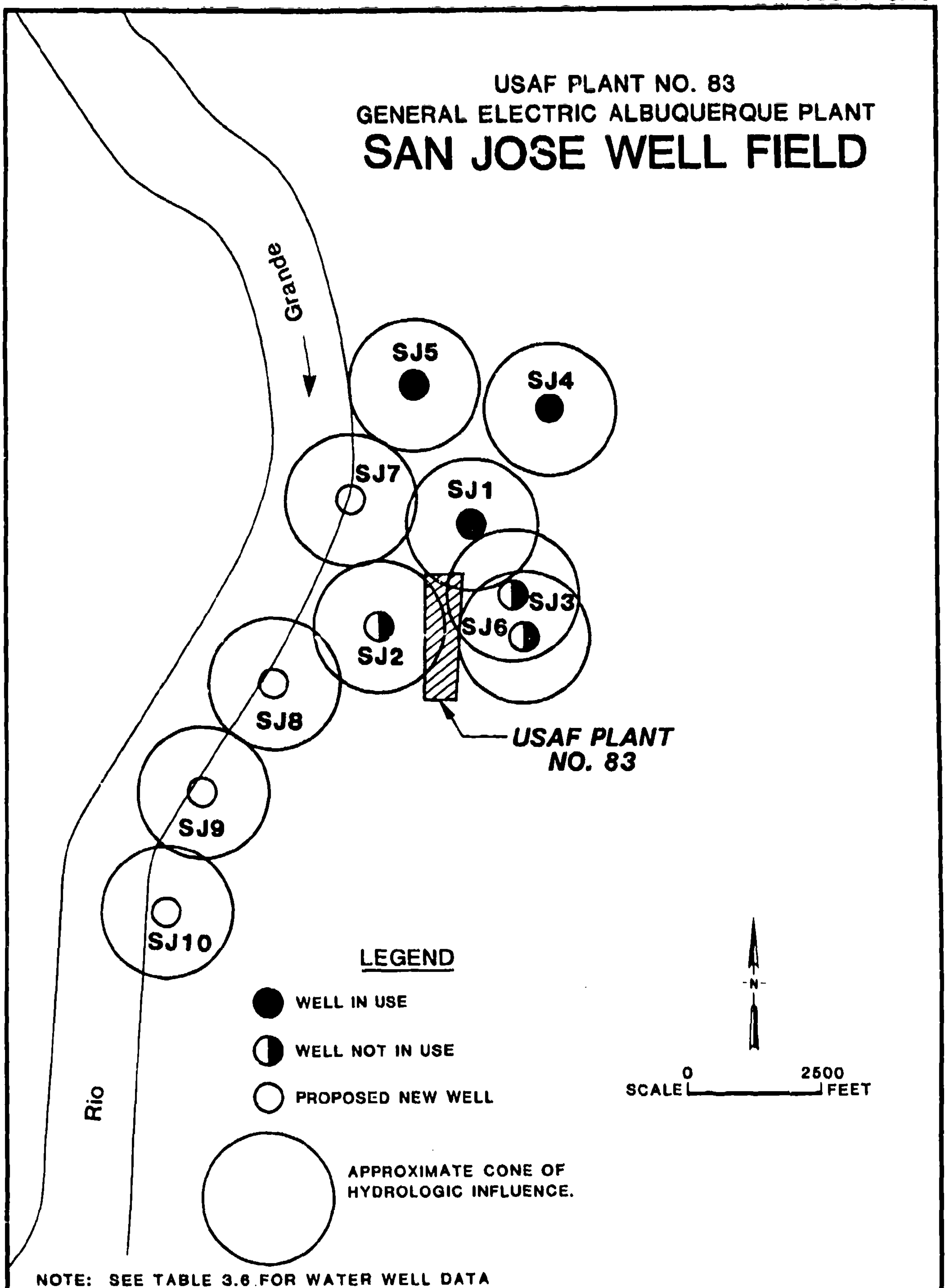
TABLE 3.5
(Continued)
SELECTED GROUND-WATER QUALITY DATA
FOR USAF PLANT NO. 83 AND VICINITY
(Parameter analyses are presented in milligrams per liter)

Well Identi-fication	Date of Sample Collection (mn-dy-yr)	Parameter							
		Arsenic[1] (0.1)	Barium (1.0)	Cadmium (0.01)	Total Chromium (0.05)	Lead (0.05)	Mercury (0.002)	Selenium (0.05)	Silver (0.05)
B1, Plant No. 83, Well No. 2	2-25-82	0.0014	0.069	0.00016	0.0013	ND	ND	ND	ND
SV8, NMEID Plant No. 83	9-7-82	0.093	3.7	0.0035	0.09	0.17	0.0002	0.0086	ND
SV9, NMEID, Plant No. 83	9-8-82	0.14	14.3	0.0076	0.21	0.7	0.004	0.0033	0.0010
SV15, NMEID Plant No. 83	9-8-82	0.13	3.8	0.0036	0.12	0.18	0.00064	0.0027	0.0007
[2]SJ6, Albuquerque City Well	6-25-80	0.021	0.1	<0.001	0.010	0	0	0	0

NOTES: 1. New Mexico Water Quality Control Commission Human Health Standards
2. See Appendix C-1 for additional water quality data.
See Figures 3.18 and 3.20 for well locations.
See Table 3.6 for well construction data.

NS = No Standard
ND = Not detected
NA = Not analyzed
DNQ = Detected but not quantified
NMEID = New Mexico Environmental Improvement Division

Source: USGS, 1981, McQuillan, et al., 1982, and Wilson Laboratories, 1982



NOTE: SEE TABLE 3.6 FOR WATER WELL DATA
SOURCE: ALBUQUERQUE WATER RESOURCES DEPARTMENT, 1983

three of the possible six existing wells are presently pumping water. Wells SJ1, SJ4 and SJ5 are presently in use. Wells SJ3 and SJ6 are shut down due to contamination. Well SJ2 is not fully operational at the present time for mechanical reasons (Pirooz, 1983).

During 1982 Plant No. 83 used approximately 0.8 million gallons of ground water per day (Rhoades, 1983). All water used at the plant comes from the City of Albuquerque. A majority of the water used is for non-contact cooling purposes and is discharged to the San Jose Drain.

Other ground-water uses in the Albuquerque area include irrigation, industrial and domestic uses. Table 3.6 summarizes the ground-water uses and well construction data for wells in the immediate vicinity of the plant. Figure 3.20 shows the location of the wells in the immediate vicinity of the plant.

BIOTIC ENVIRONMENT

Within the Albuquerque area there are eight species of animals which have been listed as endangered or threatened by Federal or New Mexico agencies (Hubbard, et al., 1979). They are as follows:

Black-footed ferret (weasel)	Federal endangered
Mississippi kite (bird)	State endangered
Bald eagle	Federal and State endangered
Peregrine falcon	Federal and State endangered
Red-headed woodpecker	State endangered
McCown's longspur (bird)	State endangered
Bluntnose shiner (fish)	State endangered
Silvery minnow	State endangered

There are no Federally- or State-listed endangered or threatened species on USAF Plant No. 83.

SUMMARY OF ENVIRONMENTAL SETTING

The environmental setting data for USAF Plant No. 83 indicate the following facts are important when evaluating past hazardous waste disposal practices.

TABLF 3.6

WATFR WELL DATA FOR USAF PLANT NO. 83 AND VICINITY

Well Identification	Owner and/or Location	Depth (Feet) Casing	Screen	Total	Diameter (inches)	Hydrogeologic Unit(s) Tapped By Well	Water Level (feet) Below Land Surface	Date (mn-dy-yr)	Approximate Elevation Below NGVD	Yield (gpm)	Use
A1	Amerigas Company	112	20	132	10	QTs	102.04	7/20/83	4899	NR	I/A
A2	Amerigas Company	510	12	522	5	QTs	118	1980	4773	NR	I
* B1	USAF Plant No. 83 Well No. 2, Bldg. 16	NR	NR	62	8	Qal	12	1956	4927	428	I/A
* B2	USAF Plant NO. 83 Well NO. 1, Bldg. 5	NR	NR	65	8	Qal	11	1953	4926	NR	I/A
C1	Conoco Oil Company	82	12	94	NR	Qal	NR	NR	NR	NR	I/A
C2	Texaco Oil Company	NR	NR	66	10	Qal	NR	NR	NR	NR	I/A
CV1	Chevron Oil Company	10	20	30	2	Qal	20.54	12-3-82	4921	NR	M
CV2	Chevron Oil Company	10	20	30	2	Qal	17.71	12-3-82	4921	NR	M
CV3	Chevron Oil Company	5	20	25	2	Qal	17.45	12-3-82	4922	NR	M
CV4	Chevron Oil Company	5	20	25	2	Qal	17.63	12-3-82	4922	NR	M
CV5	Chevron Oil Company	10	20	30	2	Qal	15.44	12-3-82	4922	NR	M
CV6	Chevron Oil Company	15	20	35	2	Qal	20.68	12-3-82	4923	NR	M

gpm = gallons per minute
mn-dy-yr = month-day-year

A = Abandoned
D = Domestic
I = Industrial
M = Monitor
U = unused

*Wells on USAF Plant No. 83 property

P = Public Supply
Qal = Alluvium
QTs = Santa Fe Group, Undivided
NR = Not Recorded
NMEID = New Mexico Environmental Improvement Division
NGVD = National Geodetic Vertical Datum of 1929

See Figures 3.19 and 3.20 for well location.
See Table 3.5 and Appendix C-1 for water quality data.

Source: Bynon, 1983, McQuillan, et al., 1982 and Hudson, 1982.

TABLE 3.6
(Continued)
WATER WELL DATA FOR USAF PLANT NO. 83 AND VICINITY

Well Identification	Owner and/or Location	Depth (Feet)			Diameter (inches)	Hydrogeologic Unit(s) Tapped By Well	Water Level (feet)			Yield (gpm)	Use
		Casing	Screen	Total			Below Land Surface	Date (mn-dy-yr)	Approximate Elevation Below NGVD		
ESI	Environmental Services, Inc.	NR	NR	NR	6	NR	71.64	12-3-82	4913	NR	I/A
HWD	New Mexico State Highway Dept.	NR	NR	70	6	Qal	NR	NR	NR	15	I
MEL	H. Melchor	NR	NR	56	2	Qal	12	1957	4929	NR	D
SJ1	Albuquerque, San Jose Well Field	NR	NR	306	NR	QTs	35.3	4-3-81	4915	NR	P
SJ2	San Jose Well Field	NR	NR	NP	NR	NR	NR	NR	NR	NR	P/U
SJ3	San Jose Well Field	360	144	504	NR	QTs	47.2	3-31-81	4907	1,000	P/U
SJ4	San Jose Well Field	268	732	1,000	NR	QTs	92.4	4-2-81	4900	NR	P
SJ5	San Jose Well Field	192	840	1,032	NR	QTs	43.7	4-1-81	4902	NR	P
SJ6	San Jose Well Field	180	732	912	NR	QTs	38.58	7-19-83	4902	NR	P/U
SJ7 thru 10	San Jose Well Field	(Proposed New Wells)									
SV3	NMEID	24	4	28	2	Qal	18.49	12-3-82	4920	NR	M

gpm = gallons per minute
mn-dy-yr = month-day-year

A = Abandoned
D = Domestic
I = Industrial
M = Monitor
U = Unused

*Wells on USAF Plant No. 83 property

P = Public Supply
Qal = Alluvium
QTs = Santa Fe Group, Undivided
NR = Not Recorded
NMEID = New Mexico Environmental Improvement Division
NGVD = National Geodetic Vertical Datum of 1929

See Figures 3.19 and 3.20 for well location.
See Table 3.5 and Appendix C-1 for water quality data.

Source: Bynon, 1983, McQuillan, et al., 1982 and Hudson, 1982.

TABLE 3.6
(Continued)
WATER WELL DATA FOR USAF PLANT NO. 83 AND VICINITY

Well Identification	Owner and/or Location	Depth (Feet) Casing	Screen	Total	Diameter (inches)	Hydrogeologic Unit(s) Tapped By Well	Water Level (feet) Below Land Surface	Date (mn-dy-yr)	Approximate Elevation Below NGVD	Yield (gpm)	Use
SV4	NMEID	20	4	24	2	Qal	18.15	12-3-82	4921	NR	M
SV5	NMEID	92	4	96	2	Qal	88.9	11-15-82	4912	NR	M
SV6	NMEID	92.5	4	96.5	2	Qal	91.69	11-15-82	4909	NR	M
SV7	NMEID	112.8	4	116.8	2	QTs	108.88	12-3-82	4911	NR	M
* SV8	NMEID	21	4	25	2	Qal	21.14	12-3-82	4919	NR	M
* SV9	NMEID	22	4	26	2	Qal	18.57	12-3-82	4922	NR	M
SV10	NMEID	97	4	101	2	QTs	95.21	12-3-82	4911	NR	M
SV11	NMEID	21	4	25	2	Qal	22.19	12-3-82	4921	NR	M
* SV15	NMEID	15	4	19	2	Qal	15.84	9-20-83	4929	NR	M
SV16	NMEID	111.7	4	115.7	2	QTs	106.32	12-3-82	4911	NR	M

gpm = gallons per minute
mn-dy-yr = month-day-year

A = Abandoned
D = Domestic
I = Industrial
M = Monitor
U = Unused

P = Public Supply
Qal = Alluvium
QTs = Santa Fe Group, Undivided
NR = Not Recorded
NMEID = New Mexico Environmental Improvement Division
NGVD = National Geodeti Vertical Datum of 1929

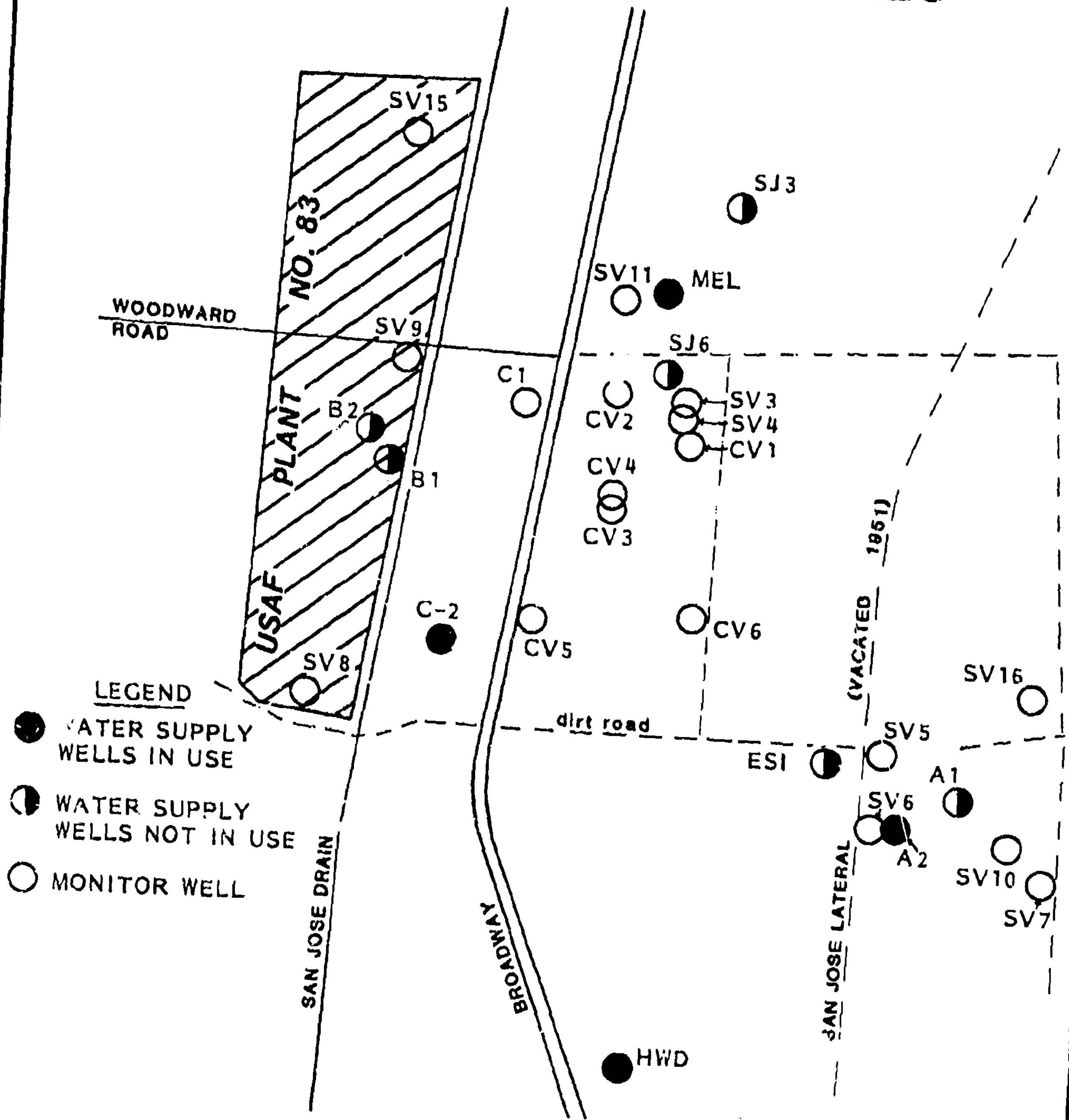
See Figures 3.19 and 3.20 for well location.
See Table 3.5 and Appendix C-1 for water quality data.

*Wells on USAF Plant No. 83 property

Source: Bynon, 1983, McQuillan, et al., 1982 and Hudson, 1982.

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

LOCATION OF WATER WELLS



NOTES: SEE TABLE 3.6 FOR WATER WELL DATA

WELLS SJ3, SJ6, ESI AND A1 ARE TEMPORARILY NOT IN USE DUE TO CONTAMINATION.

WELLS B1 AND B2 WERE ABANDONED AND CAPPED WHEN PLANT NO. 83 BEGAN USING CITY WATER.

SCALE 0 650 FEET

SOURCE: McQUILLAN, et al., 1982 AND USAF PLANT NO. 83 DOCUMENTS

1. The normal annual precipitation is 7.77 inches; the net precipitation is -54.23 inches and the 1-year, 24-hour rainfall event is estimated to be 1.25 inches. These data indicate that there is little or no potential for precipitation to infiltrate the surface soils on the plant property. Also, there is a slight potential for runoff and erosion.

2. There is limited area on the plant property where natural soils are exposed. Most of the plant property is covered by asphalt or concrete. The natural soils on the property are typically clayey or sandy loam with low permeability values. These data indicate that recharge by precipitation infiltrating the soils will be slow.

3. Surface water in the vicinity of the plant may recharge the shallow water-table aquifer or may flow downstream in the San Jose Drain to the Rio Grande.

4. Clay is a dominant lithologic unit under the plant which may limit the vertical migration of ground water.

5. Alluvial deposits of sand, gravel, cobbles and clay underly the plant. Water levels are approximately 15 to 20 feet below ground within the shallow alluvial deposits.

6. Water levels within the deeper alluvial deposits and the Santa Fe Group (undivided) are approximately 35-50 feet deep. These data indicate that a shallow water-table aquifer exists under the plant and a potential exists for horizontal and vertical migration of ground water from the shallow water-table aquifer to the regional water-table aquifer.

7. Ground-water contamination has been detected in shallow monitoring wells on the plant property.

8. The direction of ground-water flow within the shallow water-table aquifer cannot be determined based on available data.

9. The regional ground-water flow direction is east and northeast from the plant to major water producing wells for the City of Albuquerque.

10. The operation of wells SJ3 and SJ6 may impact the ground-water conditions underlying the plant in both the shallow and regional water-table aquifers.

11. The plant is located in a "declared underground water basin" which is the sole source aquifer for Albuquerque's water supply.

12. There are no Federally- or State-listed endangered or threatened species which inhabit the plant property.

CHAPTER 4

FINDINGS

This section summarizes the hazardous waste generated by activity; describes waste treatment and disposal methods; identifies the storage sites located at the plant; and evaluates the potential for environmental contamination from those sites. A review was conducted of current and past waste generation and management methods in order to identify those activities that resulted in the generation of hazardous waste. This activity involved a review of files and records, interviews with current and former plant employees, and an inspection of the plant site.

The following discussion emphasizes those wastes which have been generated at Air Force Plant No. 83 which are either hazardous or potentially hazardous. In this discussion a hazardous substance is defined either as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) or a potentially hazardous waste, which is suspected of being hazardous although insufficient data are available to fully characterize the waste material. The source of most of the hazardous waste at the plant can be directly associated with the industrial operations and the methods of treatment, storage and disposal of these wastes. No landfills or other disposal sites were found to exist on the plant site. This study included a review of the potential sources of contamination such as chemical spills which occurred at the plant and other supplemental industrial activities such as fuels management, pest management, and heat and power production.

PAST INDUSTRIAL OPERATIONS

The materials manufactured and the levels of production during the 1951 to 1967 period, when American Car and Foundry (ACF) operated the plant for the Atomic Energy Commission (AEC) differed significantly from those manufactured since 1967, when General Electric began operating the

plant for the Air Force. The review of these activites was therefore divided into two sub-sections pertaining to the operations which occurred during these two distinct periods in the plant's history.

Two additional periods of industrial operations are also discussed below. These are the Eidal Manufacturing period (1948 to 1951) and the Dow Chemical period (1967).

Eidal Manufacturing Period - 1948 to 1951

Eidal Manufacturing conducted the first industrial operations on the plant site. Eidal manufactured trailers and other types of heavy equipment. Eidal constructed the first buildings on the site in 1948 (Buildings No. 5 and No. 11). The industrial processes conducted on the site consisted primarily of welding and thus would not have generated any hazardous wastes. In 1951, the property was transferred to the Atomic Energy Commission. Eidal still has a manufacturing operation located on a site adjacent to on the west side of the plant.

American Car and Foundry (ACF) Period - 1951-1967

From 1951 to 1967 the plant was owned by the Atomic Energy Commission and operated by American Car and Foundry as the AEC contractor. The plant was operated primarily to support activities at the Los Alamos Installation. The manufacturing operations included forming, welding plating, and machining metal parts and structures and molding and machining plastics. The plant was divided into seven functional groups: Materials and Process Development, Parts Preparation, Assembly, Plate Shop, Small Machine Weld, Lead Plate Line and Miscellaneous Processing. Table 4.1 identifies the areas of the plant which were occupied by each of these groups, the types and quantities of wastes generated at the various locations and the method of disposal of these wastes throughout the period of operation.

Dow Chemical Period - 1967 (10 months)

Just prior to the Air Force's purchase and GE's subsequent occupation of Plant 83, the Dow Chemical Company joined with ACF in the operation of a portion of the facility for about 6 months. This was done for the purpose of training Dow on how to duplicate ACF's methods and skills so that the same products could be thereafter manufactured by Dow at the AEC's Rocky Flats Plant. Dow was not permitted during this time to institute any changes in the methods, materials, processes or practices being used.

TABLE 4.1

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL 1950 1960 1970 1980
ACF PERIOD 1953 - 1967				
MATERIALS AND PROCESS DEVELOPMENT (AREA #12)	5	GOLD SEL-REX	50 GALS./ONE TIME	SOLD TO U.S. MINT 1966
		SILVER CYANIDE, POTASSIUM CYANIDE	30 GALS./ONE TIME	SOLD TO U.S. MINT
		FREON	110 GALS./2 MOS.	1960 1967 COMMERCIAL SALE, EVAPORATED
		COOLANT	<20 GALS./MO.	1954 REMOVED WITH RECYCLED SCRAP CHIPS
		SMUT-GO (CHROMATE NITRIC ACID SOLUTION)	165 GALS./YR.	1956 NEUTRALIZED TO STORM SEWER
		TURCO-AVIATION (TRISODIUM PHOSPHATES)	125 LBS./YR.	NEUTRALIZED TO STORM SEWER
PARTS PREPARATION (AREA 50#)	11	TURCO SMUT GO	333 LBS. & H_2O/6 MOS.	NEUTRALIZED TO STORM SEWER; 1967 NEUTRALIZED TO SANITARY SEWER
			150 LBS./6 MOS. (SOLIDS)	TO KIRTLAND LANDFILL
	11	TURCO AVIATION	300 LBS. & H_2O/MO.	STORM SEWER; 1956 DILUTED TO SANITARY SEWER
	11	TRICHLOROETHYLENE	55 GALS./2 WKS.	COMMERCIAL SALE
	5	PENETRANT	150 GALS./YR.	TO KIRTLAND LANDFILL
	5	FIXER	55 GALS./MO.	STORM SEWER; 1956 SANITARY SEWER

DUST CONTROL - OILS SPREAD ON LOCAL ROADS FOR DUST CONTROL

TABLE 4.1 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
PARTS PREPARATION (AREA 504) (CONT'D)	5	EMULSIFIER	100 GALS./YR.	1954 — TO KIRTLAND LANDFILL
	5	DEVELOPER	100 LBS./YR.	STORM SEWER — 1955; 1955–1967 SANITARY SEWER
ASSEMBLY (AREA 505)	14a	DOW 17 ANODIZE SANDIA SPEC 400184 (ANODIZING MAGNESIUM)	4000 GALS./ONE TIME	NEUTRALIZED TO SANITARY SEWER
			2000 LBS./ONE TIME (SOLIDS)	TO KIRTLAND LANDFILL
		PHOSPHORIC ACID, CHROMIC ACID, SULFURIC ACID	110 GALS./6 MOS.	1957 — NEUTRALIZED TO SANITARY SEWER
		TURCO AVIATION	1250 LBS. & H_2O/6 MOS.	STORM SEWER — 1956; 1955–1967 DILUTED TO SANITARY SEWER
		TURCO ARR (ALKALINE RUST REMOVER) (88-95% NaOH)	3 TANKS 1250 LBS. & H_2O/6 MOS. 1000 LBS. & H_2O/6 MOS. 25 LBS. & H_2O/MO.	1956 — NEUTRALIZED TO SANITARY SEWER
		IRON PHOSPHATE	100 GALS. & H_2O/YR.	NEUTRALIZED TO SANITARY SEWER SOLIDS TO KIRTLAND LANDFILL
		CHROMIC ACID RINSE	250 LBS. & H_2O/2 YRS.	NEUTRALIZED TO SANITARY SEWER
		TURCO 4409 (AMMONIUM BIFLUORIDE)	2000 GALS./6 MOS.	NEUTRALIZED TO SANITARY SEWER
		CHROMIC ACID	3000 LBS. & H_2O/2 YRS.	NEUTRALIZED TO SANITARY SEWER
			1000 LBS./2 YRS.	SOLIDS TO KIRTLAND LANDFILL

DUST CONTROL   OILS SPREAD ON LOCAL ROADS FOR DUST CONTROL

TABLE 4.1 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL 1950 1960 1970 1980
ASSEMBLY (AREA 505) (CONT'D)		ALODINE 1200, ALUMIGOLD TRUCO, MIL-L-5541	2000 GALS./2 YRS.	NEUTRALIZED TO STORM SEWER 1955; 1956 NEUTRALIZED TO SANITARY SEWER 1967
			300 LBS./2 YRS. (SOLIDS)	TO KIRTLAND LANDFILL
		PAINT SLUDGE	50 LBS./WK.	TO KIRTLAND LANDFILL
		WATER WASH SPRAY, BOOTH OVERFLOW	50 GALS./DAY	STORM DRAIN; 1964 SANITARY SEWER
		LUBE OIL	150-200 GALS./MO.	DUST CONTROL OR SANDIA BURN PIT FOR FIRE TRAINING
		TOLUENE	SMALL RESIDUAL QUANTITIES AND WIPE RAGS	1956 KIRTLAND LANDFILL
		MEK	SMALL RESIDUAL QUANTITIES AND WIPE RAGS	KIRTLAND LANDFILL
PLATE SHOP (AREA 514)	7	DYE SOLUTIONS		
		OLIVE DRAB	2 LBS./MO.	1959 SANITARY SEWER
		YELLOW	2 LBS./MO.	SANITARY SEWER
		NICKEL ACETATE	200 GALS. & H_2O/MO.	NEUTRALIZED TO SANITARY SEWER
		CADMIUM PLATING SOLUTION (CONTAINS CADMIUM AND CYANIDE)	600 GALS.[b]	NEUTRALIZED TO SANITARY SEWER TO HYPOCHLORITE
			300 LBS. (SOLIDS)[b]	TO KIRTLAND LANDFILL

(b) IN 15 YEARS PUMPED ONE TIME AFTER PLATE SHOP FIRE IN 1962.

DUST CONTROL - OILS SPREAD ON LOCAL ROADS FOR DUST CONTROL

TABLE 4.1 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
PLATE SHOP (AREA 514) (CONT'D)	7	NICKEL CHLORIDE	10 GALS. & 40 GALS. H_2O/ 3 WKS.	1959 – 1967 NEUTRALIZED TO SANITARY SEWER
			5 LBS./3 WKS. (SOLIDS)	TO KIRTLAND LANDFILL
		SMUT-GO (CHROMATE/ NITRIC ACID SOLUTION)	300 LBS. & H_2O/3 MOS.	NEUTRALIZED TO SANITARY SEWER
			150 LBS./3 MOS. (SOLIDS)	TO KIRTLAND LANDFILL
		TURCO AVIATION	300 LBS. & H_2O/1 MO.	DILUTED TO SANITARY SEWER
		IRON PHOSPHATE (TURCO BRAND)	30 GALS. & H_2O/YR.	NEUTRALIZED TO SANITARY SEWER
			500 LBS./YR. (SOLIDS)	TO KIRTLAND LANDFILL
		CHROMIC ACID	180 LBS. & H_2O/6 MOS.	NEUTRALIZED TO SANITARY SEWER
			250 LBS./6 MOS. (SOLIDS)	TO KIRTLAND LANDFILL
		TURCO 3854 (NaOH SOLUTION)	600 GALS./MO.	NEUTRALIZED TO SANITARY SEWER
		MURATIC ACID	600 GALS./MO.	NEUTRALIZED TO SANITARY SEWER
		IRIDITE #1 (CHROMATE SOLUTION)	600 GALS./6 MOS.	NEUTRALIZED TO SANITARY SEWER
		SULFURIC ACID	600 GALS./3 MOS.	NEUTRALIZED TO SANITARY SEWER
		PERCHLOROETHYLENE	110 GALS./2 WKS.	COMMERCIAL SALE AND CONTRACT DISPOSAL

TABLE 4.1 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.)	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL 1950 1960 1970 1980
SMALL MACHINE WELD (AREA 515)	14c	TURCO ARR	125 LBS. & H_2O/MO.	1963 NEUTRALIZED TO SANITARY SEWER
		NITRIC ACID	150 GALS. & H_2O/MO.	NEUTRALIZED TO SANITARY SEWER
		NITRADD HNO_3	300 GALS./MO.	NEUTRALIZED TO SANITARY SEWER
		1,1,1, TRICHLOROETHANE	110 GALS./2 WKS.	COMMERCIAL SALE
		PENETRANT	100 GALS./YR.	1959 TO KIRTLAND LANDFILL
		EMULSIFIER	25 GALS./YR.	TO KIRTLAND LANDFILL
		FIXER	70 GALS./WK.	SANITARY SEWER
		DEVELOPER	50 GALS./WK.	SANITARY SEWER 1967
LEAD PLATE LINE	21a	LEAD FLUOROBORATE, CYANIDE COPPER PLATE, ALUMINUM-D	NO DISCHARGE ALL WASTES GIVEN TO A PLATING COMPANY WHEN PROJECT FINISHED.	1964 RECYCLED
MISCELLANEOUS PROCESSING (AREA 506)	14a	TURCO AVIATION	2000 GALS./2 MOS.	1956 DILUTED TO SANITARY SEWER
		TURCO SOLUTION (CONTAINS TCE)	WIPE CLOTHS	TO KIRTLAND LANDFILL
		COOLANT	55 GALS./2 MOS.	DUST CONTROL 1967

DUST CONTROL - OILS SPREAD ON LOCAL ROADS FOR DUST CONTROL

General Electric (GE) Period - 1967 to Present

In 1967, the Air Force acquired ownership of the plant and contracted with General Electric to manufacture aircraft engine parts, sub-assemblies and spare parts for the military. GE also manufactures commercial jet engine sub-assemblies. The types of operations conducted at the plant included machinery, fiber laminate composition, investment casting and shrouds and seals manufacturing. General Electric organized the plant into seven operational groups. They included Composites Component Operations (plastics), Composites Program, Metals Manufacturing, Investment Casting, Production and Inventory Control, Turbine Shrouds and Seals and Miscellaneous Shops (e.g. plant maintenance). Table 4.2 identifies the areas of the plant which have been occupied by each of these groups, the types and quantities of wastes generated at the various locations and the method of disposal of these wastes throughout the period of operation.

SUMMARY OF WASTE MANAGEMENT PRACTICES

Despite the difference in the products manufactured during the two major periods of the plant's history, the major industrial processes were quite similar. Therefore, even though the specific wastes and the quantities generated varied, the major categories of waste were the same throughout the life of the plant.

During the early 1950's until 1954 the liquid industrial wastes were typically discharged to the San Jose Drainage Ditch and the solids were disposed of within the Kirtland AFB landfill. It should be noted that the operations at the plant were not extensive and because of this fact, only small quantities of waste were generated during this period. In 1954, the AEC began to expand the plant facilities as the operations became more extensive. As new buildings were constructed, process and sanitary drains were linked to a tributary sewer line connected to the city sewage treatment plant. Most non-combustible wastes were discharged to the Albuquerque sewer system. The acid and caustic solutions were typically neutralized prior to their discharge. Oils were disposed of in one of two manners. Either they were transported to the nearby Sandia Base burn pit and burned during fire protection training exercises or they were sprayed over adjacent dirt roads for

TABLE 4.2

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.) PRESENT	LOCATION (BLDG. NO.) PAST	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 – 1960 – 1970 – 1980)
GE PERIOD 1967 - PRESENT					
COMPOSITES COMPONENT OPERATIONS (PLASTICS)	14d		1,1,1, TRICHLOROETHANE	50 GALS./2 WKS.	1967 CONTRACT RECYCLE; 1975 COMMERCIAL SALE
	14c		ALKALINE CLEANERS	80 GALS./6 MOS.	SANITARY SEWER; SANITARY SEWER OR CONTRACT DISPOSAL
			CHROME ETCH	80 GALS./2 YRS.	NEUT. TO SANITARY SEWER; 1975 CONTRACT DISPOSAL
	14c		ADIPRENE	3 GALS./MO.	LANDFILL; CONTRACT DISPOSAL
	14c		MS 123 (FREON BASE)	100 GALS./YR.	CONTRACT RECYCLE; 1982 CONTRACT DISPOSAL
	14c		CAYTUR 21 (METHYLENE DEANALINE)	<5 GALS./YR.	SANITARY SEWER
	14c		PASAGEL	<5 GALS./YR.	SANITARY SEWER
	14c		PAINT-BR127 (CONTAINS MEK & ORGANIC CHROMATE)	10 GALS./WK. (40 GALS./WK. PRIOR TO MID 1970's)	COUNTY LANDFILL; 1975 CONTRACT DISPOSAL
COMPOSITES PROGRAM	14c		GRAPHITE PMR-15		COUNTY LANDFILL 1981
			1,1,1-TRICHLOROETHANE	5 GALS./MO.	COMMERCIAL SALE
			PASAGEL	.5 GALS./YR.	SANITARY SEWER
METALS MANUFACTURING	14cc	6,7	WASTE CUTTING OIL		
	14bb		SIMCOOL (1968 - 1976)	200 GALS./WK.	1967 DUST CONTROL 1975
	14, 10, 14a, 14b, 14c		TRIMSOL (1976 - PRESENT)	3,400 GALS./3 WK. (90% H_2O)	CONTRACT DISPOSAL; 1975 DUST CONTROL; 1979-1980 CONTRACT DISPOSAL

SAN. SEWER - SANITARY SEWER

NEUT. - NEUTRALIZED

DUST CONTROL - OILS SPREAD ON GROUND AND ROADS FOR DUST CONTROL

TABLE 4.2 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.) PRESENT	LOCATION (BLDG. NO.) PAST	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 – 1960 – 1970 – 1980)
METALS MANUFACTURING (CONT'D)	14a	6, 7	ALKALINE CLEANERS	3,000 GALS. /YR.	NEUT. TO SAN. SEWER (1968) → 1975 → CONTRACT DISPOSAL FOR CHROME CONTAMINATED SOLUTIONS
	14a	6, 7	CHROME ETCH	4,000 GALS. /YR.	NEUT. TO SAN. SEWER → CONTRACT DISPOSAL
	14a	6, 7	CHROME SEAL	7,500 GALS. /2 YRS.	NEUT. TO SAN. SEWER → CONTRACT DISPOSAL
	14a	6, 7	SULFURIC ACID	1,200 GALS. /4 YRS.	NEUT. TO SAN. SEWER → CONTRACT DISPOSAL
	14a	6, 7	NICKEL PLATING SOLUTION	80 GALS. /YR.	NEUT. TO SAN. SEWER → CONTRACT DISPOSAL
		6, 7		100 GALS. /YR.	NEUT. TO SAN. SEWER (1975) → 1977 → CONTRACT DISPOSAL
	14a	6, 7	NITRIC ACID NITRADD	800 GALS. /2 YRS.	NEUT. TO SAN. SEWER → CONTRACT DISPOSAL
	14cc 14bb 14, 10 14a, 14b 14c	6, 7	1,1,1-TRICHLOROETHANE	150 GALS. /MO.	CONTRACT RECYCLE → 1976 → COMMERCIAL SALE
		14b 14c 14bb 14cc	TURCO SOLVE 66 (CONTAINS TCE)	100 GALS. /MO.	CONTRACT RECYCLE → 1975 → CONTRACT DISPOSAL
	14cc 14bb 14, 10 14a 14b, 14c	6, 7	MISCELLANEOUS LUBRICATING OIL	200 GALS. /WK.	DUST CONTROL → CONTRACT DISPOSAL
	14a		PAINTS AND PAINT SLUDGE (CONTAINS TOLULENE & MEK)	15 GALS. /WK.	COUNTY LANDFILL → CONTRACT DISPOSAL

SAN. SEWER - SANITARY SEWER

NEUT. - NEUTRALIZED

DUST CONTROL - OILS SPREAD ON GROUND AND ROADS FOR DUST CONTROL

TABLE 4.2 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.) PRESENT	LOCATION (BLDG. NO.) PAST	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
METALS MANUFACTURING (CONT'D)	14a		EDM OIL	100 GALS./YR.	DUST CONTROL; 1975 CONTRACT DISPOSAL
			CONTAMINATED OIL FILTERS	6/MO.	COUNTY LANDFILL
	22		CONDENSATE WITH OIL CONTAMINANTS	75 GALS./DAY	GREASE TRAP TO STORM SEWER
			GREASE AND OIL	20 LBS./6 MOS.	COUNTY LANDFILL
	14a	7	NICKEL ACETATE SEAL SOLUTION (CONTAINS NICKEL AND COBALT)	800 GALS./2 YRS. (PRIOR TO 1981 160 GALS.)	CONTRACT DISPOSAL
	14a	7	ORGANIC BLACK DYE	2,000 GALS./3 YRS. (PRIOR TO 1980 540 GALS.)	1975 CONTRACT DISPOSAL
	14a	7	ALUMINUM DEOXIDIZER (CONTAINS CHROMIUM)	800 GALS./5 YRS. (PRIOR TO 1978 540 GALS.)	CONTRACT DISPOSAL
	14a	7	CHROMATE CONVERSION	800 GALS./2 YRS. (PRIOR TO 1981 540 GALS.)	CONTRACT DISPOSAL
	12		FERRIC CHLORIDE	75 GALS./WK.	CONTRACT DISPOSAL
INVESTMENT CASTING	21b 21a		WAX	800 - 900 LBS./WK.	COUNTY LANDFILL
	21		(NOTE: YATES WAX WAS USED BETWEEN 1974 & 1975 CONTAINING 40% PCB FILLER)	11,000 LBS./ONCE	6,000 l/b to COUNTY LANDFILL; 5,000 l/b to CONTRACT DISPOSAL; 75
	5	21a	CAUSTIC (POTASH)	500 GALS./WK.	1971 SANITARY SEWER; 1979 SANITARY SEWER / CONTRACT DISPOSAL
	21d			900 GALS./2 MOS.	CONTRACT DISPOSAL
	14a			3,600 GALS./YR.	CONTRACT DISPOSAL

SAN. SEWER - SANITARY SEWER

DUST CONTROL - OILS SPREAD ON GROUND AND ROADS FOR DUST CONTROL

TABLE 4.2 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.) PRESENT	LOCATION (BLDG. NO.) PAST	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950 1960 1970 1980)
INVESTMENT CASTING (CONT'D)	21c	21a	1,1,1 TRICHLOROETHANE	150 GALS./MO.	CONTRACT RECYCLE; 77 COMMERCIAL SALE
	21a		1,1,1, TRICHLOROETHANE	50 GALS./MO.	CONTRACT RECYCLE; COMMERCIAL SALE
	21a		FREON TF	150 GALS./WK.	CONTRACT DISPOSAL; 82 RECYCLED
		21a	METHANOL	75 GALS./WK.	DUST CONTROL 71; 77
	21a		METALS DUST	200 LBS./MO.	COUNTY LANDFILL; 78 COMMERCIAL SALE
PRODUCTION AND INVENTORY CONTROL	18A4		OUT OF DATE PAINTS	100 GALS./YR.	68 CONTRACT DISPOSAL AND COUNTY LANDFILL; 75 CONTRACT DISPOSAL
TURBINE SHROUDS AND SEALS	21d	11	SODIUM NITRATE WITH CHROMATE	500 GALS./WK.	SEWER SANITARY 1979; 1981 CONTRACT DISPOSAL
			EDM OIL	200 GALS./YR.	1979 RECYCLED, CONTRACT DISPOSAL OF CONTAMINATED OILS
			CONTAMINATED OIL FILTERS	15/WK.	COUNTY LANDFILL
MISCELLANEOUS SHOPS					
AIR COMPRESSOR	*		BLOWDOWN (OIL & WATER)	2 GALS./DAY	1958 DRAINS TO GROUND SURFACE (ADSORBANT MATERIAL TO LANDFILLS)
QUALITY CONTROL					
NON DESTRUCTIVE TESTING (NDI)	11 19b	21	PENETRANT	500 GALS./YR.	DUST CONTROL; CONTRACT DISPOSAL
			EMULSIFIER	100 GALS./YR.	DUST CONTROL; CONTRACT DISPOSAL

DUST CONTROL - OILS SPREAD ON GROUND AND ROADS FOR DUST CONTROL

TABLE 4.2 (cont'd)

INDUSTRIAL OPERATIONS (Shops)

Waste Management

SHOP NAME	LOCATION (BLDG. NO.) PRESENT	LOCATION (BLDG. NO.) PAST	WASTE MATERIAL	WASTE QUANTITY	METHOD(S) OF TREATMENT, STORAGE & DISPOSAL (1950, 1960, 1970, 1980)
QUALITY CONTROL (CONT'D)					
NON-DESTRUCTIVE TESTING (NDT) (CONT'D)			1,1,1-TRICHOLROETHANE	100 GALS./YR.	DISPOSAL CONTRACT; 1967 CONTRACT; CONTRACT DISPOSAL; COMMERCIAL SALE AND CONTRACT DISPOSAL
			FIXER SOLUTION	80 GALS./WK. (PRIOR TO MID 1970's 150 GALS./WK.	SAN. SEWER, NO SILVER RECOVERY; CONTRACT DISPOSAL FOR SILVER RECOVERY
			DEVELOPER	60 GALS./WK.	SANITARY SEWER
			FLUORESCENT PHOSPHOR	20 LBS./YR.	SANITARY SEWER
CHEMICAL TESTING LABORATORIES	[illegible]		MISCELLANEOUS CHEMICAL WASTES	SMALL QUANTITIES	SANITARY SEWER; CONTRACT DISPOSAL

SAN. SEWER - SANITARY SEWER

dust control. Solvents were handled in one of several manners. The majority of the solvents were collected in drums and stored until enough had been accumulated to warrant a contract for its sale or disposal. Some solvents were also known to have been combined with the waste oils and either burned in the fire training pit or sprayed with the oil for dust control. Solid wastes (both hazardous and non-hazardous) were taken to the Kirtland AFB landfill and county landfill (also located on Kirtland AFB property). Some general refuse was incinerated on-site between 1955 and 1962.

In 1967, when the ownership of the plant was transferred to the Air Force, many of the disposal methods were modified. Acids and caustics continued to be neutralized and discharged to the sewers. Oils were stored in tanks on the south end of the plant. The tanks were periodically pumped into a truck which hauled the waste to the nearby Police Honor Farm where the oily waste was sprayed over the roads for dust control. Solvents were handled in manners similar to those of the ACF period. The majority of the solvents were stored in drums until a large enough quantity was accumulated to warrant a disposal or a contract for recycling the waste. Some solvents were combined with the waste oils and sprayed on the roads for dust control. The solid hazardous and non-hazardous wastes continued to be disposed of in the Kirtland and county landfills. Beginning around 1975 the plant began to arrange for contractors to pick up and dispose of the oils as well as the hazardous wastes generated at the facility.

HAZARDOUS WASTE STORAGE AREAS

Seven major hazardous waste storage areas have existed at Plant No. 83 (Figure 4.1). Only three of these sites are still in use. The seven sites are discussed below.

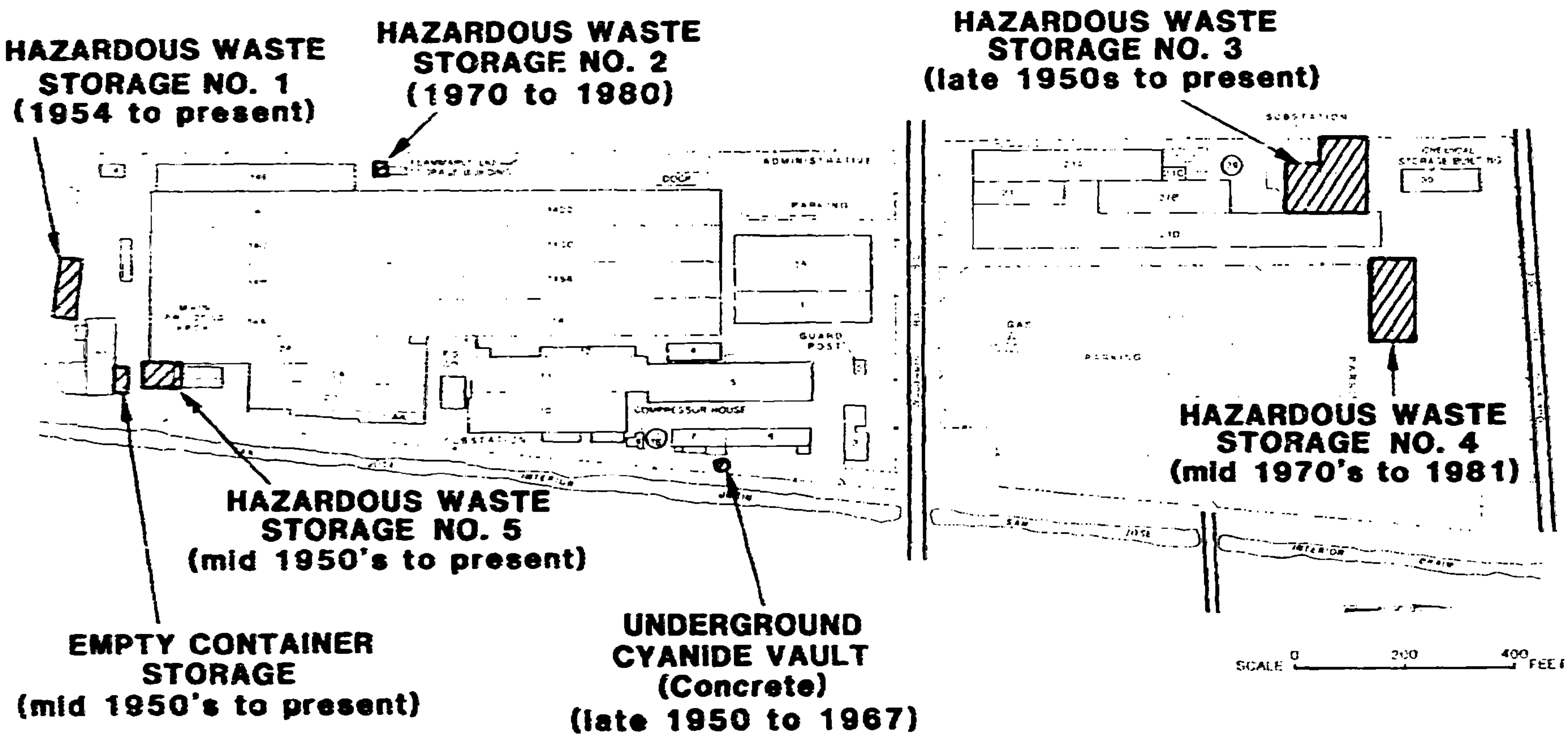
Hazardous Waste Storage No. 1

The area designated Hazardous Waste Storage No. 1 has been used as a chemical waste storage area since approximately 1954. The site was used primarily as a storage point for waste oils, coolants and some solvents used in the process areas. The area houses several tanks situated on a concrete slab. These include two 1300-gallon fiberglass open topped tanks (referred to as "swimming pool tanks"), and a

FIGURE 4.1

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT

HAZARDOUS WASTE STORAGE AREAS



SOURCE: USAF PLANT NO. 83 DOCUMENTS

3400-gallon rectangular steel box (referred to as the "green tank"). Waste oils and coolants have been the principal products stored in the area. The coolant, known as Trimsol, is a water based lubricant used in cutting and grinding machines. A recent analysis of the waste Trimsol detected 37 mg/l of carbon tetrachloride and 2 mg/l of 1,1-dichloroethylene (refer to listing of data in Appendix C-3). Other contaminants previously reported to have been detected in the waste Trimsol include methylene chloride and 1,1,1 trichloroethane.

Until August 1983, waste coolant had been stored in the two 1300-gallon "swimming pool" tanks. In that month, the marginal condition of the tanks required relocation of waste Trimsol storage to the "Green Tank". When the two "swimming pool" tanks were deactivated, the waste coolant (Trimsol) was pumped out of the tank with a vacuum tanker truck and removed for off-site disposal at an approved disposal location. Sludge which had accumulated at the bottom of the tank was shoveled into barrels. The barrels were removed as hazardous waste by contract. The tanks were steam cleaned, allowed to dry, and then covered with polyethelene to prevent accumulation of rainwater in them. The concrete containment basin surrounding the Trimsol tanks was also steam cleaned and the wastewater generated was pumped into a small pump truck and placed into the green waste oil storage tank to await removal as a hazardous waste.

Spillage in the area in and around Hazardous Waste Storage No. 1 was evident from the oily coloration on the concrete and asphalt pads in the vicinity. However, no large scale spills were known to have occurred at this site. Some of the oily coloration in the storage area may be attributed to particular design features at the storage facility. An asphalt lot directly north of the site has been used as a storage area for bins containing the metal turnings generated during various machining processes. These metal turnings are typically coated with Trimsol. The coolant has a tendency to drip to the asphalt pad beneath the bins. Runoff from this area is currently directed to a concrete containment pit surrounding the "swimming pool" tanks and periodically pumped into the green waste oil storage tank. During the recent site visit, the concrete containment pit was observed to contain several inches of rainfall runoff with a layer of suspected tramp oil floating on the surface.

Hazardous Waste Storage No. 2

Hazardous Waste Storage No. 2 is located at the south end of Building 27 which is designated the flammable liquids storage building. Since approximately 1970, this section of the building was used to store spent solvents such as MEK and 1,1,1-trichloroethane. No spills were observed or known to have occurred in the area. The building is still used for storage of some flammable materials; however, waste chemicals have not been stored at this site since the early 1980's.

Hazardous Waste Storage No. 3

Hazardous Waste Storage No. 3 has been an active storage area for waste chemicals since the late 1950's. The area is located just south of Building 30 and west of Building 21D. Presently, the yard is separated into seven segregated areas: flammable waste, caustic waste, oxidize waste, acid waste, 1,1,1 trichloroethane storage, Freon TF storage, other waste storage and empty container storage. Bags of cement are placed around the perimeter of each section to provide containment in the event of spills. The storage area is outside and has a hard-packed dirt base recently covered with approximately six inches of sand. The surface of the ground beneath the sand cover was reported to have been noticably discolored. The discoloration may have been the result of occasional leakage from the containers in storage or possibly from a previous program of spraying exposed earth areas with waste oil to reduce fugitive dust.

Waste chemicals which have been stored within this area have included (Source: GE Closure Plan, August 1983):

- 45% Potassium hydroxide solution
- 22% Potassium hydroxide solution
- BR-127 adhesive primer
- Alumitech No. 2
- 1,1,1-Trichloroethane
- Ferric chloride solution
- Inorganic alkaline cleaner solution
- Chrome seal
- Alkaline cleaner solution
- Anocut electolyte solution

- Freon TF (Trichlorotrifluoroethane)
- Waste Paints
- Nitric nitradd nickel etch waste
- Phosphoric acid etch waste
- Sulfuric acid etch waste

Two sets of soil analyses were performed in this area, the first in March 1982 and the second in June 1982 (see Appendix C-2 for sampling locations and soil test results). Both were tested for lead and total hydrocarbons. The first samples were taken near an underground leaded gasoline tank that was removed in 1981 to accomodate plant modification. Five core samples were taken. One core, Sample #1, was not analyzed. The remaining four extended roughly linearly from the tank east into areas which are now Building 21D, a roadway between Building 21D and the North Parking Lot (see Figure C.1 in Appendix C). All of the lead values were below 15 micrograms per gram (ug/g), and all of the hydrocarbons were non-detectable except one which was 191 ug/g in Sample Location #5. The exact cause of the hydrocarbon levels found in Sample #5 is unknown.

The lead levels were above 5 ug/g at sample locations nos. 2, 4 and 5 (NMEID may consider 5 ppm the decontamination criteria), however, the lead in the soil at the sites close to the gas tank is not thought to be due to the underground storage tank. The tank was pressure tested after it was removed from the ground and was certified to be non-leaking. The lead levels may have resulted from the storage of lead turnings reported to have been stored in the area designated Hazardous Waste Storage Area No. 3 during the ACF period prior to 1967 (Source: GE Closure Plan, August 1983).

In the second set of soil samples, two were taken at the eastern boundary of the Hazardous Waste Storage No. 3 adjacent to Building 21D. In addition, three samples were taken to the east of substation (see Figure C.2 in Appendix C). Of the five samples in the area (the sixth was a control outside the plant boundaries), lead values ranged from 25-168 ug/g. Hydrocarbon values ranged from 279-691 ug/l. Again, the exact cause of the hydrocarbon levels found is unknown (source: GE Closure Plan, August 1983).

Hazardous Waste Storage No. 4

Hazardous Waste Storage No. 4 is an area located just east of Building 30 (Chemical Storage Building, located on the north end of the site) in an area which is now an asphalt parking lot. The asphalt cover was not in place at the time the site was used as a waste chemical storage area. Between the mid 1970's and 1981, drums of waste freon and waste 1,1,1 trichloroethane were accumulated in this location. As many as 120 drums of waste were estimated to have been stored on the lot. These chemicals were removed for disposal by a contractor in 1981. It was reported that some small leaks may have occurred while the drums were in storage.

Waste Storage Area No. 5 and Empty Container Storage

Waste Storage Area No. 5 and the Empty Container Storage area have been used since the mid 1950's. The two areas are adjacent to one another between Building Nos. 28 and 22 on the south end of the plant site. The waste storage area was used as a collection point for the plant's general refuse and the empty container storage area was used to temporarily store empty drums until they were reused to contain waste chemicals. Some chemical wastes were stored periodically in both areas; consequently, there is a likelihood that minor leakage of chemical waste and oils may have occurred on the asphalt-covered area. Since the area has been covered with asphalt throughout the period it has been used as a storage area, the potential for soil or ground-water contamination occurring as a result of any spills is greatly reduced. However, some minor surface water contamination in the San Jose Drainage Ditch may have occurred as a result of the surface water runoff from the area. These sites are still serving as storage areas for the designated materials.

Underground Cyanide Vault

An underground concrete vault was installed during the late 1950's on the southeast corner of Building No. 6. The purpose of this vault was to collect any spillage which may have resulted from the plating vats which were located in Building No. 6. Cyanide solutions were the primary contaminant which the vault was intended to trap. The concrete vault was described as having dimensions of 3'X3'X4'. The vault is capped with a steel cover having the word "Cyanide" welded on the

surface. There were no outlets associated with the vault. The interviews conducted during the site investigation revealed conflicting stories as to whether or not any cyanide wastes entered the vault. An attempt to locate the vault revealed that the area had been covered with asphalt and therefore, an inspection of the vault could not be accomplished during the on-site investigation.

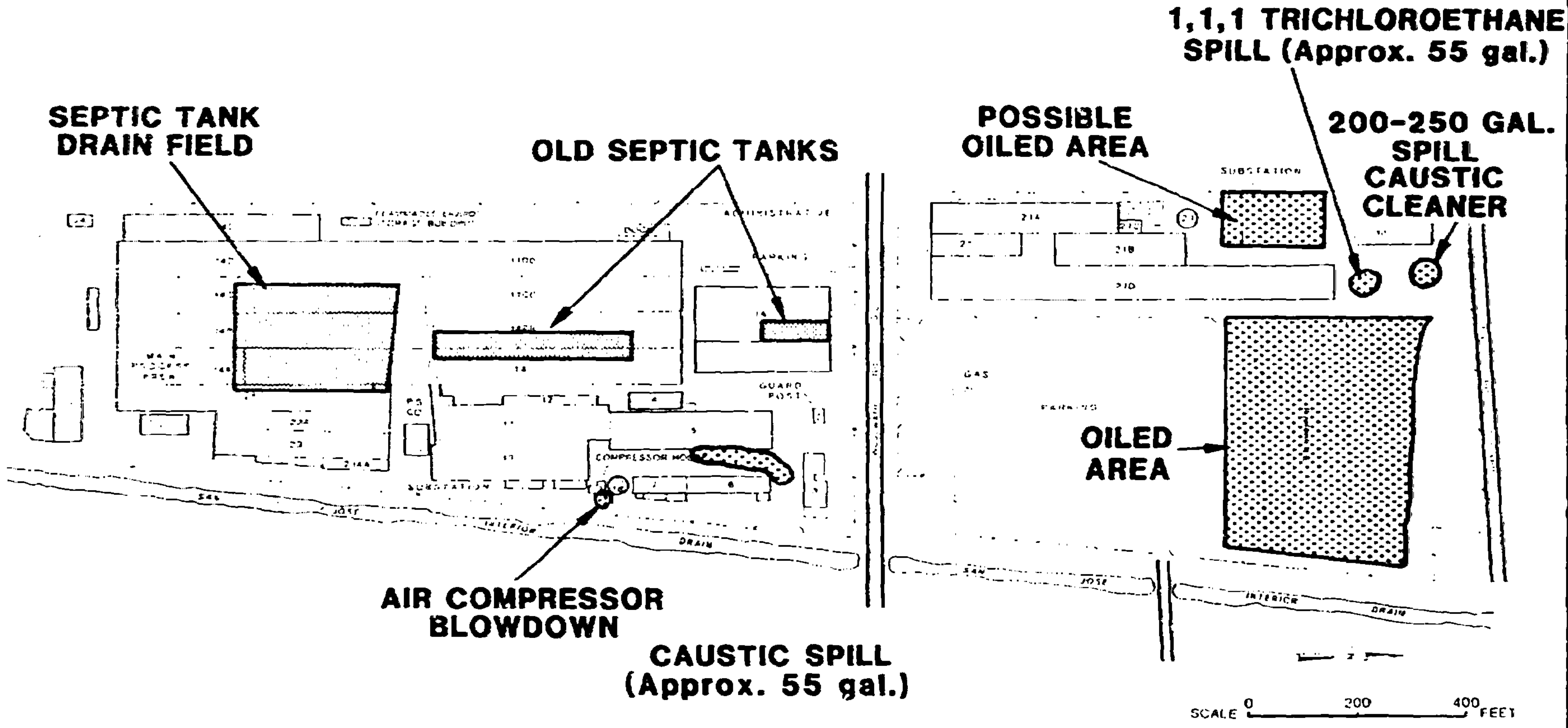
SPILLS

Chemical spills which had the potential for contaminating the environment were only known to have occurred in three areas other than the hazardous waste storage areas previously discussed. The three isolated spill areas are depicted in Figure 4.2. Two of the spills occurred in the chemical storage area adjacent to Building 30. One spill involved the rupturing of a 55-gallon drum of 1,1,1 trichloroethane. The spill occurred late in 1982 and was immediately cleaned up. The second spill involved the loss of between 200 and 250 gallons of a caustic cleaner. This spill occurred in 1981 and was also promptly cleaned up. Other small leaks from storage containers were known to have periodically occurred in and around the material storage area. The third isolated spill occurred in 1981 or the east side of Building No. 5. The spill included approximately 55 gallons of pottasium hydroxide which overflowed from a concrete vat. The chemical flowed over a concrete drive and some portion of the chemical entered a storm drain. It was estimated tht approximately 10 gallons of the caustic material was discharged to the San Jose ditch. The chemical was immediately neutralized in the ditch with phosphoric acid to meet the New Mexico water quality standards. No long term contamination is expected to have resulted from any of these isolated spills due to the small quantitles included and the clean up efforts immediately instituted.

The plant has several PCB transformers and capacitors located throughout the complex. Several small leaks have occurred over the years. All of the leaks have been contained and cleaned up. There are no indications of PCB's having been omitted to the environment from the plant.

FIGURE 4.2

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
SPILL AND WASTE DISCHARGE SITES



SOURCE: USAF PLANT NO. 83 DOCUMENTS

DISCHARGE AREAS

Three discharge areas have been identified at the plant site. The earliest of these waste discharge areas was the San Jose Drain. During the early ACF period (1952-1955), prior to the plant's connection to the city sewer system, many of the industrial wastes were allowed to discharge directly into the San Jose Drain through direct outfalls from the process areas. Since the activity level at the plant was very low prior to the expansion which began in the mid 1950's, only small quantities of industrial wastes were directly discharged to the San Jose Drain. Typical of the types of wastes which were known to have been released into the ditch included plating solutions, etching solutions, acids, caustic cleaners and various solvents. Many of the acid and caustic solutions were neutralized prior to their discharge. After the connection to the city sewer system was completed, most discharging of chemical waste directly to the drain ceased. In recent years, many of the old outfall lines have been plugged to prevent any accidental discharges into the drain. Surface runoff from the plant site is however, still discharged to the drain via storm drain outfalls.

During the years preceding the city sewer connection, sanitary wastes were treated in septic tanks and leached to the ground in a drain field located on the site which now supports Buildings 14a, 14b and 14c (Figure 4.2). No contamination is expected to have occurred as a result of these septic tanks. Since approximately 1955, all sanitary wastes have been discharged to the City of Albuquerque sewage treatment plant.

Between 1979 and 1980, waste oil consisting of spent Trimsol and miscellaneous lubricating oils were sprayed over the North Parking Lot and possibly parts of Hazardous Waste Storage No. 3. The intent of the oil discharge was to control fugitive dust on the plant site. It was reported that approximately six applications of oil occurred during the one-year period. An analysis of a soil sample collected from the parking lot only detected trace concentrations of various metals and no organic contaminants (see Appendix C-3 for complete listing of data). An organic scan was also conducted on a sample of waste Trimsol which was the primary constituent of the oil sprayed on the parking lot. The results of this analysis revealed only two organic contaimants: carbon

tetrachloride (37 mg/l) and 1,1 dichloroethylene (2 mg/l) (see Appendix C-3 for complete listing of data).

A third discharge area still in use at the plant is located adjacent to the compressor house (Building No. 9, Figure 4.2). The discharge area consists of a minor amount (less than 1 gallon/week) of oil discharged with the compressor blowdown. The blowdown is presently discharged onto an absorbent material where the oil and water is trapped. The absorbent material is periodically disposed of with the general refuse.

SUPPLEMENTAL INDUSTRIAL ACTIVITIES

Fuels Management

An underground gasoline storage tank (leaded gasoline) was located on the north side of Building 21D. The tank was installed during the early 1960's and deactivated and removed from the ground in 1981. The tank was pressure tested after it was removed from the ground and was certified to be non-leaking. In 1971 a 3,500-gallon above ground gasoline storage tank was installed adjacent to Building 24. No leaks or spills are reported to have occurred around the new tank.

Pest Management

Pest management around the plant site has been performed under a contract by outside vendors. The vendor is responsible for cleaning equipment and discarding empty containers off plant property. No pesticide spills are known to have occurred on the plant site.

Heat and Power Production

The plant is heated by natural gas, therefore, no fuel storage tanks are required and no waste products are generated in heating the plant. The plant's electric power is purchased from the regional power company.

EVALUATION OF PAST DISPOSAL ACTIVITIES AND FACILITIES

The review of past operation and maintenance functions and past waste management practices at Air Force Plant No. 83 has resulted in the identification of 13 sites which were initially considered as areas of concern with regard to the potential for contamination, as well as the potential for the migration of contaminants. These sites were evaluated

using the Decision Tree Methodology referred to in Figure 1.1. Those sites which were considered as not having a potential for contamination were deleted from further consideration. Those sites which were considered as having a potential for the occurrence of contamination and migration of contaminants were further evaluated using the Hazard Assessment Rating Methodology (HARM). Table 4.3 identifies the decision tree logic used for each of the areas of initial concern.

Based on the decision tree logic, 8 of the 13 sites originally reviewed were not considered to warrant evaluation using the Hazard Assessment Rating Methodology. The rationale for omitting these eight sites from HARM evaluation is discussed below:

Hazardous Waste Storage Area No. 2 -	No spills known to have occurred at the site.
Hazardous Waste Storage Area No. 5 -	Only minor spills suspected, area is underlain by asphalt.
Empty Container Storage -	Only minor spills suspected, area is underlain by asphalt.
Septic Tank Drain Field -	Drain field only received sanitary wastes.
Air Compressor Blowdown -	Oil discharge (<1 gallon/wk) contained and properly disposed.
1,1,1 Trichloroethane Spill -	Small spill (approx. 55-gallon), contained and immediately cleaned up.
Caustic Cleaner Spill -	Small spill, (200-250 gallons) contained and cleaned up.
Caustic Spill -	Small spill (approx. 55-gallons), neutralized.

The remaining five sites identified in Table 4.3 were evaluated using the Hazard Assessment Rating Methodology. The HARM process takes into account characteristics of potential receptors, waste characteristics, pathways for migration, and specific characteristics of the site related to waste management practices. The details of the rating procedures are presented in Appendix E. Results of the assessment for the sites are summarized in Table 4.4. The HARM system is designed to

TABLE 4.3
SUMMARY OF DECISION TREE LOGIC FOR AREAS OF INITIAL ENVIRONMENTAL CONCERN AT AIR FORCE PLANT NO. 83

Site Description	Potential for Contamination	Potential for Contaminant Migration	HARM Rating
Hazardous Waste Storage No. 1	Yes	Yes	Yes
Hazardous Waste Storage No. 2	No	No	No
Hazardous Waste Storage No. 3	Yes	Yes	Yes
Hazardous Waste Storage No. 4	Yes	Yes	Yes
Hazardous Waste Storage No. 5	Yes	Yes	No
Empty Container Storage	Yes	No	No
Underground Cyanide Vault	Yes	Yes	Yes
Septic Tank Drain Field	No	No	No
Air Compressor Blowdown	Yes	No	No
1,1,1 Trichloroethane Spill	Yes	No	No
Caustic Cleaner Spill	Yes	No	No
Caustic Spill	Yes	No	No
North Parking Lot (Oiled Area)	Yes	Yes	Yes

indicate the relative need for follow-on action. The information presented in Table 4.4 is intended for assigning priorities for further evaluation of the Air Force Plant No. 83 waste storage areas (Chapter 5, Conclusions, and Chapter 6, Recommendations). The rating forms for the individual waste storage sites at Air Force Plant No. 83 are presented in Appendix F. Photographs of some of the key disposal sites are included in Appendix D.

TABLE 4.5

SUMMARY OF HARM SCORES FOR POTENTIAL CONTAMINATION SOURCES

Rank	Site Name	Receptor Subscore	Waste Characterization Subscore	Pathways Subscore	Waste Management Factor	Overall Total Score
1	North Parking Lot	80	80	41	.95	64
2	Hazardous Waste Storage No. 1	80	60	46	1.0	62
3	Hazardous Waste Storage No. 3	80	60	41	1.0	60
4	Hazardous Waste Storage No. 4	80	50	41	.95	54
5	Underground Cyanide Vault	80	40	41	0.10	51

CHAPTER 5

CONCLUSIONS

The goal of the IRP Phase I study is to identify sites where there is potential for environmental contamination resulting from past waste disposal practices and to assess the probability of contaminant migration from these sites. The conclusions given below are based on field inspections, review of records and files, review of the environmental setting, and interviews with plant personnel, past employees, and state government employees. Table 5.1 contains a list of the potential contamination sources identified at Air Force Plant No. 83 and a summary of the HARM scores for those sites. Additional sites originally considered as potential contamination sources did not have sufficient data to warrant further consideration and were not evaluated using the HARM system. Information pertaining to those sites listed on Table 5.1 is summarized below and the follow-on recommendations are presented in Chapter 6.

NORTH PARKING LOT

There is sufficient evidence that the North Parking Lot site has potential for creating environmental contamination and a follow-on investigation is warranted. The North Parking Lot was an exposed dirt lot prior to 1981. Between 1979 and 1980 waste oils were applied to the surface of the lot to reduce fugitive dusts. The waste oil consisted primarily of Trimsol and other lubricants used at the plant. Analysis of the waste oil detected several solvent contaminants. Soil samples collected from the area detected only trace concentrations of heavy metals and no organic contaminants. Surface-water runoff from the site would flow east toward the San Jose Drain. Natural surface soils consist of loam and clay loam with relatively low permeability. Ground water is usually present at sixteen feet below ground. Clay is present between approximately two and eight feet deep, thus low permeability zones would be expected between the site and the water table. The site received a HARM score of 64.

TABLE 5.1

SITES EVALUATED USING THE HAZARD ASSESSMENT
RATING METHODOLOGY
AIR FORCE PLANT NO. 83

Rank	Site	Operating Period	Final HARM Score
1	North Parking Lot	1979-1980	64
1	Hazardous Waste Storage No. 1	1954-Present	62
2	Hazardous Waste Storage No. 3	Late 1950's to Present	60
4	Hazardous Waste Storage No. 4	Mid 1970's-1981	54
5	Underground Cyanide Vault	Mid 1950's to Late 1970's	51

HAZARDOUS WASTE STORAGE NO. 1

There is sufficient evidence that the Hazardous Waste Storage No. 1 site has potential for creating environmental contamination and a follow-on investigation is warranted. Hazardous Waste Storage No. 1 has been used as a chemical waste storage area since approximately 1954. The principal waste materials stored at the site were waste oils, coolants (Trimsol) and some solvents. The area is located on the south end of the plant and houses several different types of storage tanks. All of the tanks are situated on a concrete slab. Two of the larger tanks used for storing waste Trimsol have recently been deactivated and cleaned. The occurrence of spillage in the area was evident from the coloration of the concrete and asphalt in the vicinity of the waste storage area, as well as the Trimsol contamination observed on the surface of the storm water contained in the concrete pit surrounding the Trimsol tanks. Surface-water runoff at this site would flow south and east to the San Jose Drain. Natural surface soils consist of loam and clay loam with relatively low permeability. Ground water is usually present at twenty feet below ground. Subsurface sediments consist of sand with minor amounts of clay, thus the subsurface permeability would be expected to be higher than the surface soil zone permeability. The site received a HARM score of 62.

HAZARDOUS WASTE STORAGE NO. 3

There is sufficient evidence that the Hazardous Waste Storage No. 3 site has potential for creating environmental contamination and a follow-on investigation is warranted. Hazardous Waste Storage No. 3 has been an active chemical waste storage area since the late 1950's. The site is located on the north side of the plant just south of Building 30. Essentially all of the chemical wastes generated at the plant have been stored for one period or another at this site. Until early 1983, the chemicals were stored in drums or other smaller containers directly on a hard-packed dirt base. In 1981, the site was covered with approximately six inches of sand. During the study, it was indicated that the dirt base had been discolored. The discoloration may have been a result of past leaks and spills in the area or from suspected applications of waste oil to reduce fugitive dust. Soil samples were collected in and

around the site. The samples were tested for hydrocarbons and lead. Hydrocarbon concentrations ranged from non-detectable to 191 ug/g. Lead concentrations ranged from 5 to 168 ug/g. Surface-water runoff from this site would flow east toward the San Jose Drain. Natural surface soils consist of clay loam with relatively low permeability. Ground water is usually present at sixteen feet below ground. Clay is present between approximately two and seven feet deep, thus low permeability zones would be expected between the site and the water table. The site received a HARM score of 60.

HAZARDOUS WASTE STORAGE NO. 4

There is sufficient evidence that the Hazardous Waste Storage No. 4 site has potential for creating environmental contamination and a follow-on investigation is warranted. Hazardous Waste Storage No. 4 is situated on the north end of the plant site in an area which now serves as the North Parking Lot. Between the mid 1970's and 1981, drums of waste freon and waste 1,1,1 trichloroethane were accumulated in this location. It was estimated that as many as 120 drums were stored on the bare earth lot. The drums were removed for contract disposal in 1981. It was reported that some small leaks may have occurred while the drums were in storage. However, since both solvents are highly volatile, it is unlikely that minor leakage would have caused any long term contamination. The majority of this past storage area is now paved. Surface-water runoff from this site would flow east toward the San Jose Drain. Natural surface soils consist of loam and clay loam with relatively low permeability. Ground water is usually present at sixteen feet below ground. Clay is present between approximately two and eight feet deep, thus low permeability zones would be expected between the site and the water table. The site received a HARM score of 54.

UNDERGROUND CYANIDE VAULT

There is sufficient evidence that the Underground Cyanide Vault has potential for creating environmental contamination and a follow-on investigation is warranted. The Underground Cyanide Vault, located on the southeast corner of Building No. 6, was installed in the late 1950's to collect spillage from plating vats located in Building No. 6. The

primary purpose of the vault was to prevent the release of cyanide solutions utilized in the plating operations. The concrete vault was described as having walls with dimensions of 3'x3'x4' and a steel cover. The vault was reported to have no outlets. The interviews conducted during the site investigation revealed conflicting stories as to whether or not any cyanide wastes entered the vault. The cover of the vault is located beneath a paved area and therefore, could not be inspected during the site visit. The natural surface soils consist of clay loam with relatively low permeability. Ground water is usually present at eighteen feet below ground. Clay exists between approximately three and seven feet deep, thus low permeability zones would be expected between the vault and the water table. The site received a HARM score of 51.

GROUND-WATER CONTAMINATION IN THE SAN JOSE AREA OF THE SOUTH VALLEY OF ALBUQUERQUE

USAF Plant No. 83 is located in the general area of an EPA designated ground-water contamination problem in the San Jose Area of the South Valley of Albuquerque. City wells SJ3 and SJ6 are not being used due to organic contamination. The plant has been named by EPA as one of the many potentially responsible parties based on an Order of Consent issued under the authority of Section 106 of CERCLA. Several potentially responsible parties are conducting or have completed conducting an investigation of the ground-water conditions underlying their respective property. Organic compounds used at the plant and at other industrial sites in the area have been found in the plant monitoring wells and in wells SJ3 and SJ6. Seven organic contaminants have been detected in the monitoring wells on the plant. The concentration of one organic contaminant, 1,1-dichlorethane, was found to be above the NMWQCC Human Health Standard.

Hydrogeologically, the plant is located in an area which is underlain by clay layers which are not present in areas southeast of the city wells SJ3 and SJ6. These clay layers act as low permeability zones which would tend to slow the vertical migration of ground water from the shallow water-table aquifer to the deeper regional water-table aquifer from which wells SJ3 and SJ6 withdrew water while pumping. Data presently available does not allow the complete evaluation of the ground-water conditions underlying the plant.

CHAPTER 6

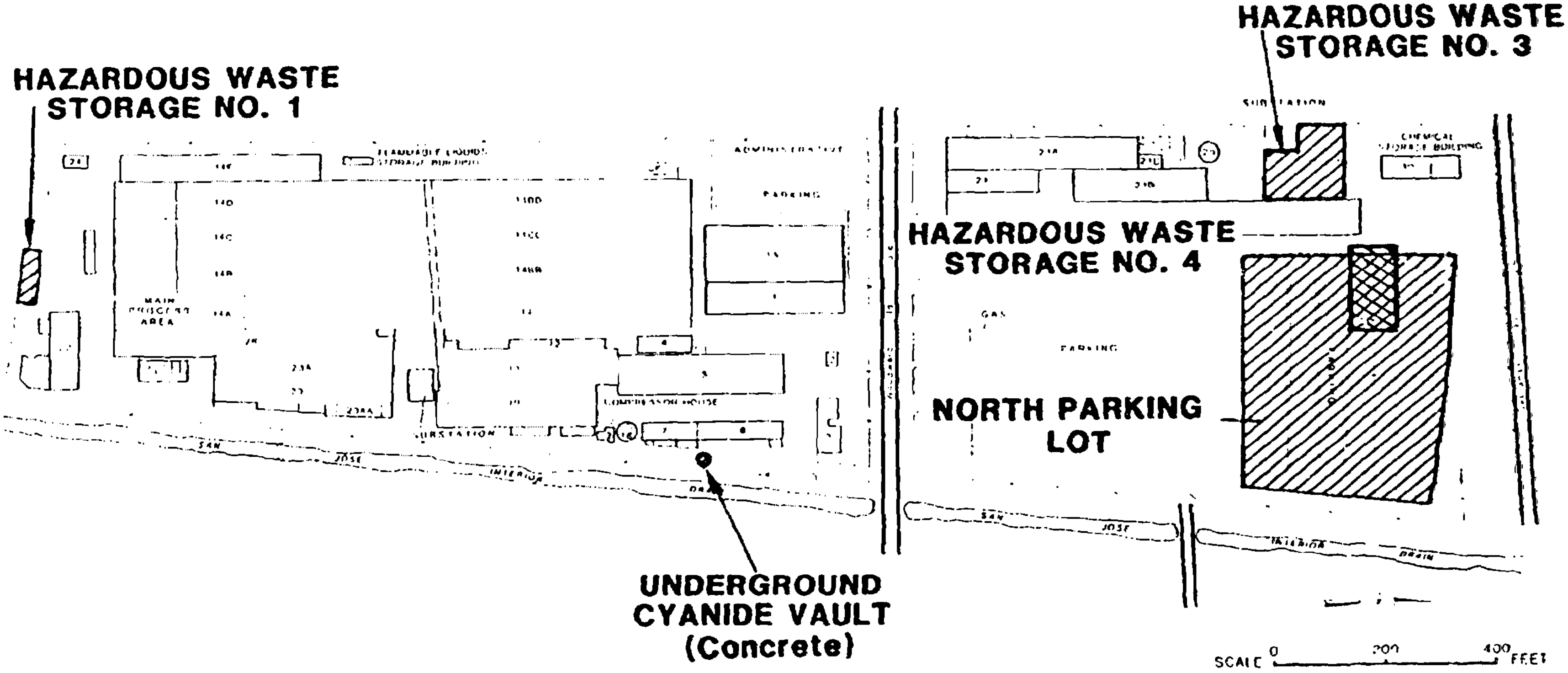
RECOMMENDATIONS

PHASE II MONITORING

Five sites were identified at Air Force Plant No. 83 as having the potential for environmental contamination (Figure 6.1). These sites have been evaluated using the HARM system which assesses their relative potential for contamination. As a result of the information collected during the study, it was determined that additional data and/or information concerning each of the sites would be required in order to clearly ascertain whether or not the site was contributing to any form of environmental contamination. Therefore, the following recommendations have been developed for each of the sites. The recommended actions are generally one-time sampling programs to determine if contamination does exist at the site. If contamination is identified, the sampling program may need to be expanded to define the extent of contamination. Ground-water monitoring wells should be installed and sampled in both the shallow water-table aquifer and the regional water-table aquifer. The wells should be constructed of 2-inch diameter stainless steel screen and casing. Stainless steel is recommended due to the potential problem of PVC screen and casing contributing organics to the well water and due to the relatively low values of organic contaminants found to date in the plant monitoring wells. Stainless steel would improve the accuracy of the well sample analyses. During the well installations readings with an organic vapor analyser or similar equipment should be made. Wells placed into the shallow water-table aquifer should be approximately 25 feet deep. The wells placed into the regional water-table aquifer should be approximately 150 feet deep. The complete EPA designated list of priority pollutants except asbestos should be analyzed in each sample. The recommended monitoring program for Phase II is summarized in Table 6.1.

FIGURE 6.1

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT
SITES OF POTENTIAL ENVIRONMENTAL CONTAMINATION



SOURCE: USAF PLANT NO. 83 DOCUMENTS

TABLE 6.1
RECOMMENDED MONITORING PROGRAM FOR PHASE II
USAF PLANT NO. 83

Ranking Number	Site Name	Rating Score	Recommended Monitoring	Sample Analyses	Comments
1	North Parking Lot	64	Conduct shallow soil coring and sampling; coordinate placement of wells for this site with Hazardous Waste Storage No. 4; sample existing well SV15.	Complete priority pollutants except asbestos.	Continue monitoring if sampling indicates contamination. Additional wells may be necessary to assess extent of contamination.
2	Hazardous Waste Storage No. 1	62	Conduct shallow soil coring and sampling; install and sample 1 upgradient and 1 downgradient well in the shallow water-table aquifer and 1 upgradient and 1 down-gradient well in the regional water-table aquifer and sample existing well SV8.	Complete priority pollutants except asbestos.	Continue monitoring if sampling indicates contamination. Additional wells may be necessary to assess extent of contamination.
3	Hazardous Waste Storage No. 3	60	Conduct shallow soil coring and sampling; install and sample 1 upgradient and 2 downgradient wells in the shallow water-table aquifer and 1 upgradient and 2 down-gradient wells in the regional water-table aquifer.	Complete priority pollutants except asbestos.	Continue monitoring if sampling indicates contamination. Additional wells may be necessary to assess extent of contamination.
4	Hazardous Waste Storage No. 4	54	Conduct shallow soil coring and sampling; coordinate placement of wells for this site with North Parking Lot; sample existing well SV15.	Complete priority pollutants except asbestos.	Continue monitoring if sampling indicates contamination. Additional wells may be necessary to assess extent of contamination.
5	Underground Cyanide Vault	51	Inspect vault for leakage; if leakage has occurred install and sample 1 downgradient well in the shallow water-table aquifer; inspect existing wells B1 and/or B2 by downhole geophysical techniques and sample as upgradient wells; if contamination is found in shallow water-table aquifer, install and sample 1 down-gradient well in regional water-table aquifer; sample existing well SV9.	pH, Total Dissolved Solids, Cyanide, EP Toxicity Metals.	Continue monitoring if sample indicates contamination. Additional wells may be necessary to assess extent of contamination.

1) North Parking Lot - At least ten soil core samples should be collected from the parking lot. The samples should be analyzed for the parameters on the complete EPA designated priority pollutant list except asbestos. Soil pH should also be tested. The core samples should be approximately 3 feet in depth.

One upgradient and two downgradient wells should be installed in the shallow water-table aquifer. One upgradient and two downgradient wells should be installed in the regional water-table aquifer. The wells will also serve as monitoring wells for Hazardous Waste Storage No. 4. Samples from the wells and existing well SV15 should be analyzed for the parameters on the complete EPA designated priority pollutant list except asbestos.

2) Hazardous Waste Storage No. 1 - At least ten soil core samples should be collected in the areas adjacent to the storage area to determine whether any soil or asphalt contamination may have resulted from runoff from the site. The samples should be collected south of the "green tank" and "swimming pool" tanks along the facility fence line. Samples of soil and asphalt should also be collected on the east and west sides of the storage area. Samples should be collected in the areas which have any visual evidence of oil contamination. One control core sample should be collected from an area close to the test area but away from hazardous waste or industrial activities. The core samples should be a minimum of 1 foot in depth and at least four samples including the control should be 3 feet in depth. The samples should be analyzed for the parameters on the complete EPA designated priority pollutant list except asbestos. Soil pH should also be tested.

One upgradient and one downgradient well should be installed in the shallow water-table aquifer. One upgradient and one downgradient well should be installed in the regional water-table aquifer. Samples from the wells and existing well SV8 should be analyzed for the parameters on the complete EPA designated priority pollutant list except asbestos.

3) Hazardous Waste Storage No. 3 - At least ten core samples should be collected in the areas within and adjacent to the storage area to determine whether any soil, sand or asphalt contamination exists at the site, as well as whether any contamination may have migrated from the site. The samples should be analyzed for the parameters on the complete EPA designated priority pollutant list except asbestos. Soil pH should also be tested. The core samples should be a minimum of 1 foot in depth and at least four samples should be 3 feet in depth.

One upgradient and two downgradient wells should be installed in the shallow water-table aquifer. One upgradient and one downgradient well should be installed in the regional water-table aquifer. Samples from the wells should be analyzed for the parameters on the complete EPA designated priority pollutant list except asbestos.

4) Hazardous Waste Storage No. 4 - Hazardous Waste Storage No. 4 is located within the North Parking Lot and therefore, the sampling program for this site will be combined with the sampling program for the North Parking Lot. At least two of the ten soil core samples for the North Parking Lot should be taken within the Hazardous Waste Storage No. 4. These two core samples should be 5 feet deep.

The ground-water monitoring wells for this site will be the same wells as for the North Parking Lot. Samples from the wells and existing wells SV15 should be analyzed for the parameters on the complete EPA designated priority pollutant list except asbestos.

5) Underground Cyanide Vault - During the site investigation the precise location of the underground vault could not be determined because the area had been paved. Further investigations should be conducted to locate the vault. A metal detector may be useful to identify the location of the vault's steel cover. When the vault

is located, the cover should be removed to determine whether any materials are still contained within the concrete chamber. If any materials are found, they should be removed and analzyed for cyanide and the EP Toxicity metals. The interior of the chamber should also be inspected to determine whether any leakage was evident.

If leakage has occurred, one downgradient monitoring well should be installed into the shallow water-table aquifer. Wells B1 or B2 could be used as upgradient wells. These wells would need to be geophysically logged to determine the exact screen settings prior to use. If cyanide contamination is confirmed in the shallow water-table aquifer, one downgradient well should be installed in the regional water-table aquifer. The upgradient well for either of the other two sites (Hazardous Waste Storage No. 1 or Hazardous Waste Storage No. 3) could be used as the upgradient well for this site in the regional water-table aquifer. Samples from the well and existing wells should be analyzed for pH, total dissolved solids, cyanide and EP toxicity metals.

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APPENDIX A

BIOGRAPHICAL DATA

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Biographical Data

R. E. Mayfield, P.E.

Civil/Environmental Engineer

Education

B.S. Civil Engineering, New Mexico State University, 1976.
M.S.C.E., Sanitary Engineering, New Mexico State University, 1978.

Professional Affiliations, Honors and Awards

Registered Professional Engineer (Georgia, #13254)
Georgia Water Control Association
Water Pollution Control Federation
Chi Epsilon
Tau Beta Pi

Experience Record

1972 - 1973 National Soils Service, Inc., Houston, TX
1978 - Date Engineering-Science, Inc., Atlanta, GA

Pertinent Experience

Mr. Mayfield has over four years project experience while working for Engineering-Science in liquid and solid waste management and spill control planning for both governmental and industrial clients. His experience includes planning, conducting and managing both investigative and design type projects. Specific management and engineering experience is highlighted below.

- Project engineer for identifying potential chemical spill situations and developing effective spill prevention, control and countermeasures (SPCC) plans for three industrial clients.

- Project Manager for an investigation of an abandoned hazardous waste landfill site. The project was sponsored by an industrial firm which had utilized the site during its active life. Project objectives included definition of site geology, hydrogeology and shydrology. The project resulted in collection of sufficient information for development of a remedial action plan and detailed design of closure procedures. Recommendations were made on the necessary steps to secure the site.

- Project Engineer on an Air Force Phase I IRP project conducted at a base located in the southwestern U. S. Responsibilitites included investigation of closed on-base landfill disposal sites.

- Project Engineer on a hazardous waste management study for a major plastics manufacturing company. Responsibilitites included identification and investigation of a number of operating commercial hazardous waste landfills and incinerators.

R. E. Mayfield, P.E. (Continued)

Recommendations were developed concerning the client's best disposal alternatives based on economic, technical, and regulatory considerations.

- Project Engineer involved in a detailed technical critique of a proposed hazardous waste disposal landfill design. Site soils and hydrologic conditions were examined as well as the proposed civil design. Facility design and site conditions were compared to RCRA 3004 Guidelines as well as regulations issued by several state agencies.

Publications and Presentations

"LFDESIGN; A Computer Model to Design and Cost Disposal Facilities for Fossil Energy Wastes," Summary Review of Fossil Energy Waste Sampling and Characterization Program, Laramie Energy Technology Center, Laramie, Wyoming, August 1982.

"Development of Preliminary Hazardous and Non-Hazardous Wastes Landfill Designs using Computer Methods", D.O.E. RCRA Utility Advisory Task Force Meeting, Atlanta Georgia, February 1982.

"Study of Solid Waste Managemen lternatives for the City of Murray, Kentucky," prepared for Office of Solid Waste Management, U.S. EPA, Region IV, Atlanta, Georgia, October 1979.

"Technical Assistance to the City of Birmingham, Alabama," prepared for Office of Solid Waste Management, U.S. EPA, Region IV, Atlanta, Georgia, October 1980.

"Technical Assistance to the City of Aiken, South Carolina," prepared for Office of Solid Waste Management, U.S. EPA, Region IV, Atlanta, Georgia, December 1980.

"Textile Industry/EPA Technical Study of July 1974 BATEA Effluent Standards," prepared for Industrial Processes Division, Industrial Environmental Research Lab, U.S. EPA, January 1980 (Coauthors, E. J. Schroeder and T. N. Sargent).

"Expansion and Improvement of the STPDESIGN Computer Program System, "M.S. Thesis, New Mexico State University, Las Cruces, New Mexico, 1978.

"State of the Art of Computer Programming in Sewage Treatment Plant Design," A.S.C.E. Conference on Computing in Civil Engineering, Atlanta, Georgia, June 1978 (Coauthors, W. A. Barkely, R. D. Hill, and T. M. Shoemarker).

#10

Biographical Data

MARK I. SPIEGEL

Environmental Scientist

Personal Information

Date of Birth: 11 April 1954

Education

B.S. in Environmental Health Science (Magna cum laude), 1976, University of Georgia, Athens, Georgia
Limnology and Environmental Biology, University of Florida, Gainesville, Florida
MBA 1983, Marketing, Georgia State University

Professional Affiliations

American Water Resources Association
Technical Association of the Pulp and Paper Industry

Experience Record

1974-1976 U.S. Environmental Protection Agency, Surveillance and Analysis Division. Cooperative Student. On assignment to Air Surveillance Branch, participated in ambient air study in Natchez, Mississippi, and operated unleaded fuel sampling program for Southeast National Air Surveillance Network. For Engineering Branch, participated in NPDES compliance monitoring of industrial facilities throughout the southeast; operation and maintenance studies of municipal waste treatment facilities; and post-impoundment study of West Point Reservoir, West Point, Georgia. Participated in industrial bioassay studies for the Ecological Branch.

1977-Date Engineering-Science. Environmental Scientist. Responsible for the conduct of water and wastewater sampling programs and analyses, quality control, laboratory process evaluations, and evaluation of other environmental assessment data. Conducted leachate extraction studies of sludges produced at a large organic chemicals plant to define nature of sludges according to the Resource Recovery and Conservation Act Guidelines. Involved in laboratory quality assurance program for the analysis of water samples used in a stream modeling project. Conducted a water quality modeling study for Amerada Hess Corporation to determine the assimilative capacity of

Mark I. Spiegel (Continued)

a stream receiving effluent from a southern Mississippi refinery.

Participated in bench-scale industrial treatability studies conducted for the American Textile Manufacturers Institute and Eli Lilly Pharmaceuticals in Mayaguez, Puerto Rico, and in carbon adsorption studies for an American Cyanamid chemical plant and Union Carbide Agricultural Products Division.

Involved in various aspects of several industrial environmental impact assessments including preliminary planning for a comprehensive study for St. Regis Paper Company on a major pulp and paper mill expansion project. Assisted in preparation of third-party EIS for EPA and Mobil Chemical Company concerning a proposed 16,000-acre phosphate mining and beneficiation facility. Developed an EIA prior to construction of a pulp and paper complex by the Weyerhaeuser Company in Columbus, Mississippi, which included preparation of a separate document for the Interstate Commerce Commission concerning the construction of a railroad spur to serve the complex. Also involved in formulating the water quality, water resource and socio-economic aspects of an environmental impact assessment for International Paper Company. Participated in large scale site evaluation to determine the suitability and environmental permitting requirements of a site for an east coast brewery for the Adolph Coors Company. Participated in a study to evaluate various options for developing a large parcel of land in the coastal section of North Carolina. The study involved evaluating both the market potential and environmental constraints of various options for development such as timber harvesting, peat mining, corporate farming and aquaculture.

Project Manager. Conducted comprehensive process evaluation of an 80 mgd wastewater treatment system for Weyerhaeuser Company. Responsible for a study to determine the leaching characteristics of sludges for a paint manufacturing facility for RCRA compliance. Also managed study for development of a solid waste management plan for a ceramic pottery manufacturer in northern Alabama which included evaluating surface and ground-water contamination potential from existing disposal site and assisting manufacturer in developing a disposal program acceptable to state agencies.

Mark I. Spiegel (Continued)

Participated as project team member for Phase I Installation Restoration Program projects for the Department of Defense. Studies were conducted at twelve Air Force bases to identify past hazardous waste disposal practices that could result in migration of contaminants and to recommend priority sites requiring further investigation.

Developed an Environmental Audit Manual for a pharmaceutical company. The purpose of the audit manual was to aid the company in identifying areas where a particular facility may not comply with Federal and state environmental regulations.

10/83

Biographical Data

H. DAN HARMAN, JR.
Hydrogeologist

Personal Information

Date of Birth: 7 December 1948

Education

B.S., Geology, 1970, University of Tennessee, Knoxville, TN

Professional Affiliations

Registered Professional Geologist (Georgia NO.569)
National Water Well Association (Certified Water Well Driller No. 2664)
Georgia Ground-Water Association

Experience Record

1975-1977 Northwest Florida Water Management District, Havana, Florida. Hydrogeologist. Responsible for borehole geophysical logger operation and log interpretation. Also reviewed permit applications for new water wells.

1977-1978 Dixie Well Boring Company, Inc., LaGrange, Georgia. Hydrogeologist/Well Driller. Responsible for borehole geophysical logger operation and log interpretation. Also conducted earth resistivity surveys in Georgia and Alabama Piedmont Provinces for locations of water-bearing fractures. Additional responsibilities included drilling with mud and air rotary drilling rigs as well as bucket auger rigs.

1978-1980 Law Engineering Testing Company, Inc., Marietta, Georgia. Hydrogeologist. Responsible for ground-water resource evaluations and hydrogeological field operations for government and industrial clients. A major responsibility was as the Mississippi Field Hydrologist during the installation of both fresh and saline water wells for a regional aquifer evaluation related to the possible storage of high level radio-active waste in the Gulf Coast Salt Domes.

1980-1982 Ecology and Environment, Inc., Decatur, Georgia. Hydrogeologist. Responsible for project management of hydrogeological and geophysical investigations at uncontrolled hazardous waste sites. Also prepared Emergency Action Plans and Remedial Approach Plans for U.S. Environmental Protection Agency. Additional

H. Dan Harman, Jr. (Continued)

responsibilities included use of the MITRE hazardous ranking system to rank sites on the National Superfund List.

1982-1983 NUS Corporation, Tucker, Georgia. Hydrogeologist. Responsible for project management of hydrogeological and geophysical investigations at uncontrolled hazardous waste sites.

1983-Date Engineering-Science, Inc., Atlanta, Georgia. Hydrogeologist. Responsible for hydrogeological evaluations during Phase I Installation Restoration Program projects for the Department of Defense.

Publications and Presentations

"Geophysical Well Logging: An Aid in Georgia Ground-Water Projects," 1977, coauthor: D. Watson, The Georgia Operator, Georgia Water and Pollution Control Association.

"Use of Surface Geophysical Methods Prior to Monitor Well Drilling," 1981. Presented to Fifth Southeastern Ground-Water Conference, Americus, Georgia.

"Cost-Effective Preliminary Leachate Monitoring at an Uncontrolled Hazardous Waste Site," 1982, coauthor: S. Hitchcock. Presented to Third National Conference on Management of Uncontrolled Hazardous Waste Sites, Washington, D.C.

"Application of Geophysical Techniques as a Site Screening Procedure at Hazardous Waste Sites," 1983, coauthor: S. Hitchcock. Proceedings of the Third National Symposion and Exposition on Aquifer Restoration and Ground-Water Monitoring, Columbus, Ohio.

APPENDIX B

LIST OF INTERVIEWEES

APPENDIX B

LIST OF INTERVIEWEES

Most Recent Position	Years of Service
1. Environmental Protection Engineer	<1
2. Manager of Employee and Community Relations	7
3. Supervisor of Safety and Security	5
4. Truck Driver	27
5. Waste Collector	<1
6. Maintenance Manager (retired)	25
7. Manager, Manitenance and Plant Engineering	29
8. Truck Driver	26
9. Truck Driver	27
10. Manager, Material Services	25
11. Manager, Non-Destructive Testing	23
12. ACF Plant Superintendent	14
13. ACF Plant Engineer	14
14. Manager, Quality Control Laboratory	22
15. Purchasing Agent	27
16. Chemical Engineer Quality Control	26
17. Supervisor Lift Truck Operations	28
18. Buyer, Chemical Products	15
19. Process Engineer, Plating	15
20. Manager of Safety Branch	12
21. Manager of Manufacturing	25

OUTSIDE AGENCY CONTACTS

Agency	Contact
City of Albuquerque, Water Resources Dept., Albuquerque, NM; Assistant Systems Planning Engineer; (505) 766-7354	Brian Pirooz
City of Albuquerque, Water Systems Division, Albuquerque, NM; Division Head; (505) 766-7100	Sam Cummings
City of Albuquerque, Wastewater Treatment Plant, Albuquerque, NM; Maintenance Superintendent; (505) 766-7955	George Holley
New Mexico Department of Game and Fish, Santa Fe, NM; (505) 827-7882	Publication Clerk
New Mexico Health and Environment Dept, Environmental Improvement Div., Water Pollution Control Bureau, Santa Fe, NM; Geologist; (505) 984-0020	Dennis McQuillan
New Mexico Health and Environment Dept, Water Quality Control Commission, Santa Fe, NM; (505) 827-5271	Publication Clerk
New Mexico State Engineers Office Albuquerque, NM; Engineer; (505) 841-6323	Jack Reed
New Mexico State Engineer Office, Water Use and Reports Section, Santa Fe, NM; Section Head; (505) 827-6110	Robert L. Borton
Middle Rio Grande Conservancy District, Albuquerque, NM; District Engineer; (505) 243-6796	Mr. Shah
U.S. Army Corps of Engineers, Albuquerque, NM; Technical Services Representative (505) 766-2616	Thomas Ryan
U.S. Department of Agriculture, Soil Conservation Service, Albuquerque, NM; (505) 766-3277	Publications Clerk
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Climatic Data Center, Asheville, NC; (704) 259-0682	Publication Clerk

U.S. Department of Defense, Defense Logistics Agency, DLAS Residency - Albuquerque, NM Administrative Contracting Office (505) 844-3418	George Wilkinson
U.S. Department of Energy, ALO (Legal) - Albuquerque, NM; (505) 846-2123	Jim Randall
U.S. Environmental Protection Agency, Superfund Division, Enforcement Section, Dallas, Texas; Environmental Engineer (214) 767-9703	Larry Wright
U.S. Geological Survey, Water Resources Division, Albuquerque, NM; Hydrologist (505) 766-6506	Georgianna E. Kues
U.S. Geological Survey, Water Resources Division, Albuquerque, NM; Water Quality Specialist (505) 766-1173	Kim Ong

APPENDIX C

AIR FORCE PLANT NO. 83

SUPPLEMENTAL INFORMATION AND DATA

C-1 - Ground-Water Quality Data
C-2 - Analytical Results for Soil Samples Taken in the Vicinity of Hazardous Waste Storage Area No. 3
C-3 - Analytical Results for the Soil Sample Taken in the North Parking Lot

APPENDIX C-1

GROUND-WATER QUALITY DATA

APPENDIX C-1
ADDITIONAL GROUND-WATER QUALITY DATA FOR USAF PLANT NO. 83 AND VICINITY

(Parameter analyses are presented in milligrams per liter)

Well Identification	Parameter	New Mexico Standard	Date of Sample Collection (mn-yr) 6-80	11-80	12-80	2-81 (split sample)	2-81	2-81	2-81	10-81	2-82	2-82 (split sample)	2-82
SJ6 (Albuquerque San Jose Well Field)	Benzene	0.01	DNQ	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
	Methyl-	0.01	DNQ	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
	Dimethyl-	NS	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
	Ortho-	NS	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
	Ethyl-	NS	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Methane												
	Dichloro-	NS	DNQ	ND	ND	ND	ND	ND	ND	ND	ND	0.004	ND
	Trichloro-	NS	DNQ	ND	ND	ND	ND	<0.010	ND	NA	ND	0.003	ND
	Tetrachloro-	0.01	DNQ	ND	ND	ND	ND	ND	ND	NA	ND	0.001	<0.001
	Ethane												
	1,1-Dichloro-	NS	ND	ND	ND	0.006	<0.010	<0.010	<0.010	DNQ	ND	<0.003	0.013
	1,2-Dichloro-	0.02	NA	ND	ND	ND	ND	ND	ND	NA	ND	<0.001	0.004
	1,1,1-Trichloro-	NS	NA	ND	ND	ND	ND	ND	ND	ND	ND	<0.001	ND
	1,1,2-Trichloro-	NS	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	NA
	1,1,2,2-Tetrachloro-	NS	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	NA
	Ethene												
	1,1-Dichloro-	0.005	DNQ	ND	0.011	0.007	0.011	<0.010	0.010	NA	ND	<0.003	0.010
	1,2-Trans-Dichloro-	NS	NA	ND	ND	<0.001	ND	<0.010	ND	DNQ	ND	NA	ND
	Trichloro-	0.1	DNQ	ND	0.010	0.006	0.010	<0.010	<0.010	DNQ	ND	0.006	0.021
	Tetrachloro-	0.02	DNQ	ND	ND	0.004	<0.010	<0.010	<0.010	DNQ	ND	0.004	0.016
	1,2-Dichloropropane	NS	NA	ND	ND	ND	ND	ND	ND	NA	ND	NA	NA
	Acetone	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Methyl Ethyl Ketone	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Other Organics	NS	DNQ	DNQ	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3-Methyl 1-2-Butanone	NS	NA	NA	NA	NA	NA	NA	NA	DNQ	NA	NA	NA

Source: McQuillan, et al., 1982

NA = Not Analyzed
ND = Not Detected
mn-yr = month-year

DNQ = Detected but not quantified
NS = No Standard

APPENDIX C-1 (Continued)
ADDITIONAL GROUND-WATER QUALITY DATA FOR USAF PLANT NO. 83 AND VICINITY

(Parameter analyses are presented in milligrams per liter)

Well Identification	Parameter	New Mexico Standard	Date of Sample Collection (mo-dy-yr) 6-25-80	9-9-82	9-9-82 (split sample)	Well Identification	Date of Sample Collection 3-7-82	9-7-82 (split sample)	Well Identification	Sample Collect. 3-7-82	Well Identification	Date of Sample Collection 9-8-82	9-8-82 (split sample)
	Benzene	0.01	ND	ND	ND		ND	ND		ND		ND	ND
	Methyl-	0.01	.92	NA	NA		ND	ND		ND		ND	ND
	Dimethyl-	NS	.310	.300	NA		NA	NA		NA		NA	NA
	Ortho-	NS	.190	NA	NA		NA	NA		NA		NA	NA
	Ethyl-	NS	.016	.300	ND		ND	ND		ND		ND	ND
	Methane												
	Dichloro-	NS	6.3	37	35.4		ND	ND		ND		NA	ND
	Trichloro-	NS	.130	.05	ND		ND	ND		ND		ND	ND
	Tetrachloro-	0.01	ND	ND	ND		ND	ND		ND		ND	ND
SV10 (Monitor well on Amerigas Co. Property)	Ethane								SV9 (Monitor Well on USAF Plant No. 83 Property)	ND	SV15 (Monitor Well on USAF Plant No. 83 Property)	0.049	0.017
	1,1-Dichloro-	NS	ND	1.7	41.6	SV8 (Monitor Well on USAF Plant No. 83 Property)	ND	ND		0.0015		ND	ND
	1,2-Dichloro-	0.02	ND	.035	ND		ND	ND		0.0038		0.002	ND
	1,1,1-Trichloro-	NS	5.5	15	82.1		ND	ND		ND		ND	ND
	1,1,2-Trichloro-	NS	ND	ND	ND		ND	ND				ND	ND
	1,1,2,2-Tetra-chloro-	NS	ND	ND	ND		ND	0.0012		ND		ND	ND
	Ethene												
	1,1-Dichloro-	0.005	.820	9	ND		ND	ND		ND		0.009	0.009
	1,2-Trans-Dichloro-	NS	1.5	ND	61		ND	ND		ND		ND	ND
	Trichloro-	0.1	3.1	6	95.6		ND	ND		ND		0.0006	0.0013
	Tetrachloro-	0.02	9.4	20	13.2		ND	ND		0.0018		ND	ND
	1,2-Dichloropropane	NS	ND	NA	ND		NA	ND		ND		NA	ND
	Acetone	NS	100	150	82.2		NA	NA		NA		NA	NA
	Methyl Ethyl Ketone	NS	4.5	6	22.5		NA	NA		NA		NA	NA
	113 Freon									DNQ			DNQ

NA = Not Analyzed
ND = Not Detected
NS = No Standard

DNQ = Detected but not quantified
mo-dy-yr = month-day-year

Source: McQuillan, et al., 1982

APPENDIX C-2

RESULTS FOR SOIL SAMPLES TAKEN IN THE VICINITY

OF HAZARDOUS WASTE STORAGE AREA NO. 3

Source: Closure Plan and Financial Requirements
for Interim Status Hazardous Waste Storage Facilities,
General Electric Co. Aircraft Engine Business Group
Albuquerque, NM Air Force Plant No. 83, August 1983

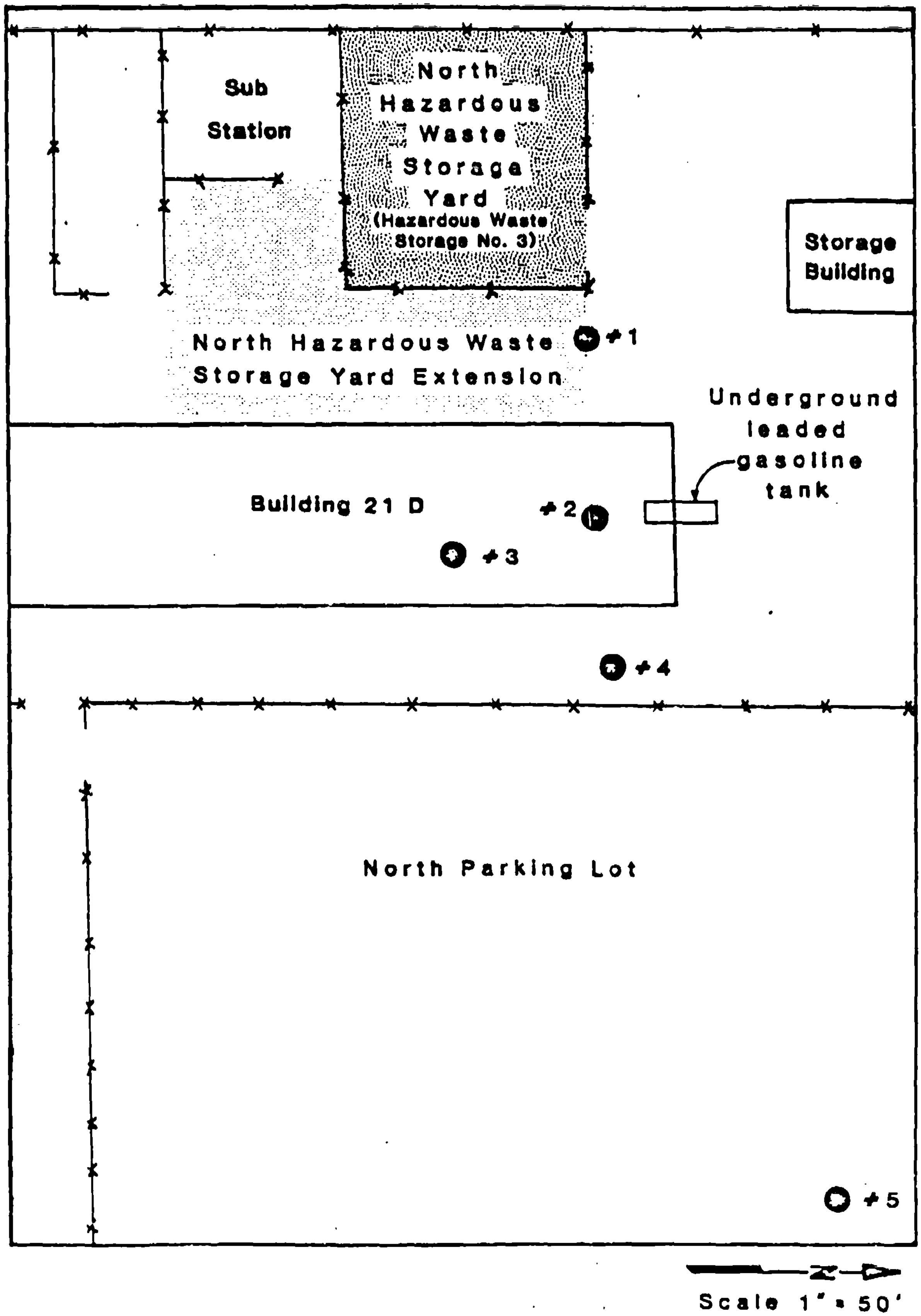


Figure C-1 Soil Samples Taken Near the Underground Leaded Gasoline Tank in March, 1982

W I L S O N   L A B O R A T O R I E S

528 NORTH NINTH STREET - P.O. BOX 1858 - SALINA, KANSAS 67401 - (913)825-7186

LABORATORY REPORT   PAGE 1

IENT: GENERAL ELECTRIC
ATTN: JIM BAECHTEL
336 WOODWARD ROAD
ALBUQUERQUE, NM 87102

DATE RPTD.: 06/10/82
DATE RCVD.: 05/21/82
PURCHASE AUTH: A4R06434
FILE NO.: 81-9570

ANALYTE	CONCENTRATION	UNITS	ANALYST	BOOK/PAGE

LAB NUMBER: 8205-0314   SAMPLE DESCRIPTION: N. STORAGE YARD #1
ORDER NUMBER: .2398   SPECIAL INSTRUCTIONS: ANALYZED AS RECEIVED
DATE SAMPLED: 04/27/82   TIME SAMPLED: 10:00 A.M.

HYDROCARBONS, TOTAL	392.	UG/G, DRY WT.	WAR	119 / 41

--CONCLUSION--LAB NUMBER: 8205-0314

LAB NUMBER: 8205-0314D   SAMPLE DESCRIPTION: N. STORAGE YARD #1
ORDER NUMBER: .2398   SPECIAL INSTRUCTIONS: ACID DIGESTION
DATE SAMPLED: 04/27/82   TIME SAMPLED: 10:00 A.M.

LEAD	143.	UG/G, DRY WT.	DEM	180 / 54

--CONCLUSION--LAB NUMBER: 8205-0314D

LAB NUMBER: 8205-0315   SAMPLE DESCRIPTION: N. STORAGE YARD #2
ORDER NUMBER: .2398   SPECIAL INSTRUCTIONS: ANALYZED AS RECEIVED
DATE SAMPLED: 04/27/82   TIME SAMPLED: 10:15 A.M.

HYDROCARBONS, TOTAL	496.	UG/G, DRY WT.	WAR	119 / 41

--CONCLUSION--LAB NUMBER: 8205-0315

LAB NUMBER: 8205-0315D   SAMPLE DESCRIPTION: N. STORAGE YARD #2
ORDER NUMBER: .2398   SPECIAL INSTRUCTIONS: ACID DIGESTION
DATE SAMPLED: 04/27/82   TIME SAMPLED: 10:15 A.M.

LEAD	40.	UG/G, DRY WT.	DEM	180 / 55

--CONCLUSION--LAB NUMBER: 8205-0315D

LAB NUMBER: 8205-0316   SAMPLE DESCRIPTION: N STORAGE YARD #3
ORDER NUMBER: .2398   SPECIAL INSTRUCTIONS: ANALYZED AS RECEIVED
DATE SAMPLED: 04/27/82   TIME SAMPLED: 10:30 A.M.

WILSON LABORATORIES

LABORATORY REPORT PAGE 2
CLIENT:GENERAL ELECTRIC DATE RPTD.:06/10/82

ANALYSIS	CONCENTRATION	UNITS	ANALYST	BOOK/PAGE
HYDROCARBONS, TOTAL	621.	UG/G, DRY WT.	WAR	119 / 41

--CONCLUSION--LAB NUMBER: 8205-0316

LAB NUMBER:8205-0316D SAMPLE DESCRIPTION:N. STORAGE YARD #3
ORDER NUMBER:.2398 SPECIAL INSTRUCTIONS:ACID DIGESTION
DATE SAMPLED: 04/27/82 TIME SAMPLED: 10:30 A.M.

LEAD	47.	UG/G, DRY WT.	DEM	180 / 56

--CONCLUSION--LAB NUMBER: 8205-0316D

LAB NUMBER:8205-0317 SAMPLE DESCRIPTION:N. STORAGE YARD #4
ORDER NUMBER:.2398 SPECIAL INSTRUCTIONS:ANALYZED AS RECEIVED
DATE SAMPLED: 04/27/82 TIME SAMPLED: 10:45 A.M.

HYDROCARBONS, TOTAL	596.	UG/G, DRY WT.	WAR	119 / 41

-CONCLUSION--LAB NUMBER: 8205-0317

LAB NUMBER:8205-0317D SAMPLE DESCRIPTION:N. STORAGE YARD #4
ORDER NUMBER:.2398 SPECIAL INSTRUCTIONS:ACID DIGESTION
DATE SAMPLED: 04/27/82 TIME SAMPLED: 10:45 A.M.

LEAD	25.	UG/G, DRY WT.	DEM	180 / 57

- CONCLUSION--LAB NUMBER: 8205-0317D

LAB NUMBER:8205-0318 SAMPLE DESCRIPTION:N. STORAGE YARD #5
ORDER NUMBER:.2398 SPECIAL INSTRUCTIONS:ANALYZED AS RECEIVED
DATE SAMPLED: 04/27/82 TIME SAMPLED: 11:00 A.M.

HYDROCARBONS, TOTAL	279.	UG/G, DRY WT.	WAR	119 / 41

-CONCLUSION--LAB NUMBER: 8205-0318

LAB NUMBER:8205-0318D SAMPLE DESCRIPTION:N. STORAGE YARD #5
ORDER NUMBER:.2398 SPECIAL INSTRUCTIONS:ACID DIGESTION
DATE SAMPLED: 04/27/82 TIME SAMPLED: 11:00 A.M.

LEAD	168.	UG/G, DRY WT.	DEM	180 / 58

WILSON LABORATORIES

LABORATORY REPORT PAGE 3

CLIENT:GENERAL ELECTRIC DATE RPTD.:06/10/82

ANALYSIS	CONCENTRATION	UNITS	ANALYST	BOOK/PAGE

--CONCLUSION--LAB NUMBER: 8205-0318D

LAB NUMBER:8205-0319 SAMPLE DESCRIPTION:BACKGROUND NEAR ROAD #6
ORDER NUMBER:.2398 SPECIAL INSTRUCTIONS:ANALYZED AS RECEIVED
DATE SAMPLED: 05/17/82 TIME SAMPLED: 9:30 A.M.

HYDROCARBONS, TOTAL	291.1	MG/L	WAP	119 / 41

--CONCLUSION--LAB NUMBER: 8205-0319

LAB NUMBER:8205-0319D SAMPLE DESCRIPTION:BACKGROUND NEAR ROAD #6
ORDER NUMBER:.2398 SPECIAL INSTRUCTIONS:ACID DIGESTION
DATE SAMPLED: 05/17/82 TIME SAMPLED: 9:30 A.M.

LEAD	95.	UG/G, DRY WT.	DEM	180 / 59

--CONCLUSION--LAB NUMBER: 8205-0319D

LAB NUMBER:8205-0320 SAMPLE DESCRIPTION:BLDG. 22 O.S./N.W. #7
ORDER NUMBER:.2398 SPECIAL INSTRUCTIONS:ORGANIC PREP
DATE SAMPLED: 05/05/82 TIME SAMPLED: 11:30 A.M.

**GC/MS VOLATILE COMPOUNDS

1V. ACROLEIN	ND(10)	UG/G	CK	175 / 106
2V. ACRYLONITRILE	ND(10)	UG/G	CK	175 / 106
3V. BENZENE	ND(1)	UG/G	CK	175 / 106
4V. BIS(CHLOROMETHYL)ETHER	ND(1)	UG/G	CK	175 / 106
5V. BROMOFORM	ND(1)	UG/G	CK	175 / 106
6V. CARBON TETRACHLORIDE	ND(1)	UG/G	CK	175 / 106
7V. CHLOROBENZENE	ND(1)	UG/G	CK	175 / 106
8V. CHLORODIBROMOMETHANE	ND(1)	UG/G	CK	175 / 106
9V. CHLOROETHANE	ND(1)	UG/G	CK	175 / 106
10V. 2-CHLOROETHYLVINYL ETHER	ND(1)	UG/G	CK	175 / 106
11V. CHLOROFORM	ND(1)	UG/G	CK	175 / 106
12V. DICHLOROBROMOMETHANE	ND(1)	UG/G	CK	175 / 106
13V. DICHLORODIFLUOROMETHANE	ND(1)	UG/G	CK	175 / 106
14V. 1,1-DICHLOROETHANE	ND(1)	UG/G	CK	175 / 106
15V. 1,2-DICHLOROETHANE	ND(1)	UG/G	CK	175 / 106
16V. 1,1-DICHLOROETHYLENE	ND(1)	UG/G	CK	175 / 106
17V. 1,2-DICHLOROPROPANE	ND(1)	UG/G	CK	175 / 106
18V. 1,3-DICHLOROPROPYLENE	ND(1)	UG/G	CK	175 / 106
19V. ETHYLBENZENE	ND(1)	UG/G	CK	175 / 106

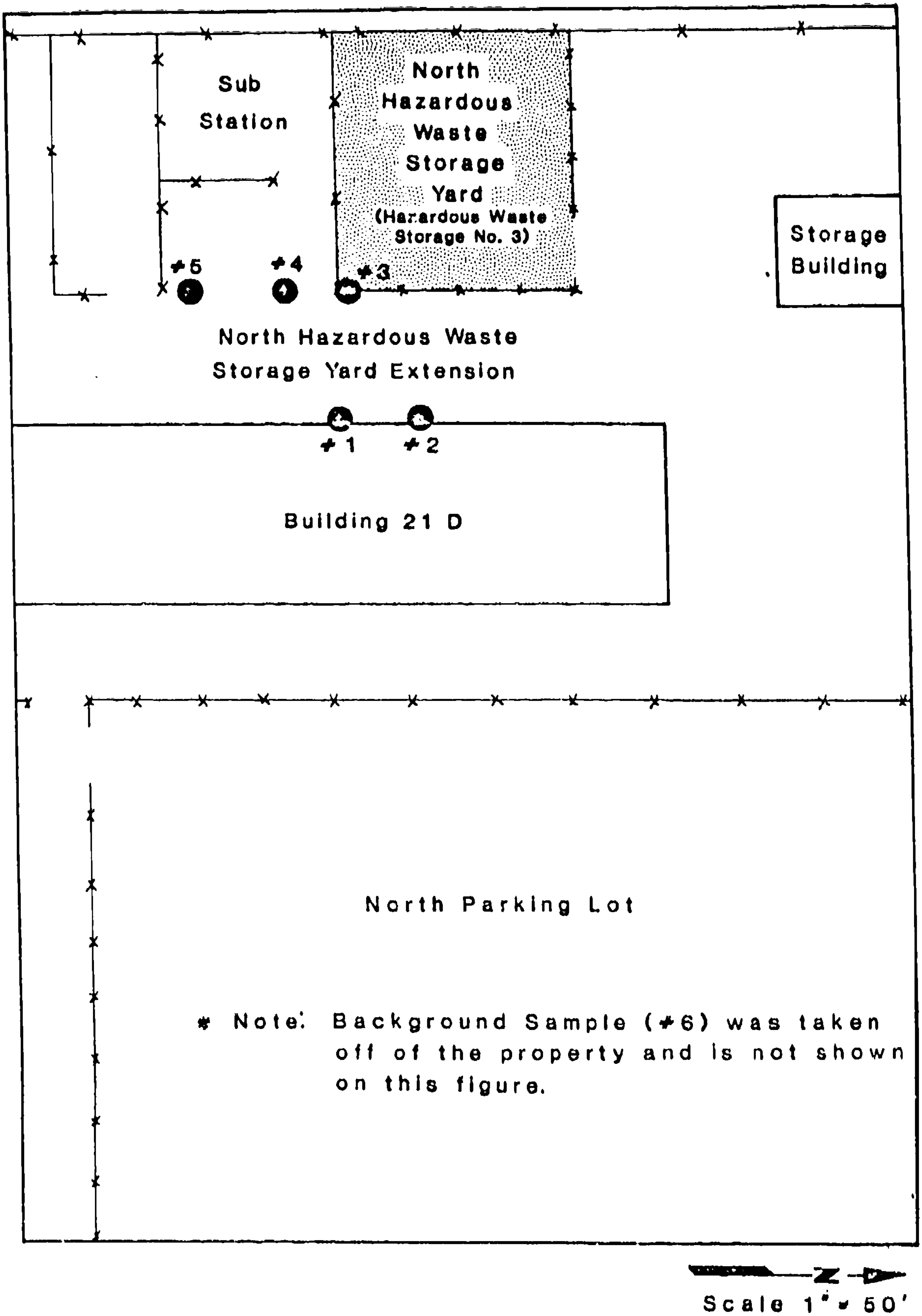


Figure C-2 Soil Samples Taken in the North Hazardous Waste Storage Yard Extension in June, 1982

WILSON LABORATORIES

528 NORTH NINTH STREET - P.O. BOX 1858 - SALINA, KANSAS 67401 - (913)825-71

LABORATORY REPORT PAGE 1

CLIENT:GENERAL ELECTRIC
ATTN:JIM BAECHTEL
336 WOODWARD ROAD
ALBUQUERQUE, NM 87102

DATE RPTD.:03/27/82
DATE RCVD.:03/11/82
PURCHASE AUTH:ZARA12597
FILE NO.:81-9570

ANALYSIS	CONCENTRATION	UNITS	ANALYST	BOOK/PAGE

LAB NUMBER:8203-0142 SAMPLE DESCRIPTION:LOC. #2 35 FT X 48 IN
ORDER NUMBER:.2044 SPECIAL INSTRUCTIONS:ANALYZED AS RECEIVED
DATE SAMPLED: 03/10/82

HYDROCARBONS, TOTAL	ND(1.0)	UG/G, DRY WT.	DEM	119 / 34

--CONCLUSION--LAB NUMBER: 8203-0142

LAB NUMBER:8203-0142D SAMPLE DESCRIPTION:LOC. #2 35 FT X 48 IN
ORDER NUMBER:.2044 SPECIAL INSTRUCTIONS:ACID DIGESTION
DATE PREP.: 03/18/82

LEAD	13.2	UG/G, WET WT.	BLD	178 / 31

--CONCLUSION--LAB NUMBER: 8203-0142D

LAB NUMBER:8203-0143 SAMPLE DESCRIPTION:LOC. #3 80 FT X 48 IN
ORDER NUMBER:.2044 SPECIAL INSTRUCTIONS:ANALYZED AS RECEIVED
DATE SAMPLED: 03/10/82

HYDROCARBONS, TOTAL	ND(1.0)	UG/G, DRY WT.	DEM	119 / 34

--CONCLUSION--LAB NUMBER: 8203-0143

LAB NUMBER:8203-0143D SAMPLE DESCRIPTION:LOC. #3 80 FT X 48 IN
ORDER NUMBER:.2044 SPECIAL INSTRUCTIONS:ACID DIGESTION
DATE PREP.: 03/18/82

LEAD	4.9	UG/G, WET WT.	BTF	178 / 30

--CONCLUSION--LAB NUMBER: 8203-0143D

LAB NUMBER:8203-0144 SAMPLE DESCRIPTION:LOC #4 60 FT X 48 IN
ORDER NUMBER:.2044 SPECIAL INSTRUCTIONS:ANALYZED AS RECEIVED
DATE SAMPLED: 03/10/82

W I L S O N   L A B O R A T O R I E S

LABORATORY REPORT PAGE 2

CLIENT:GENERAL ELECTRIC DATE RPTD.:03/29/82

ANALYSIS	CONCENTRATION	UNITS	ANALYST	BOOK/PAGE
HYDROCARBONS, TOTAL	ND(1.0)	UG/G, DRY WT.	DEM	119 / 34

--CONCLUSION--LAB NUMBER: 8203-0144

LAB NUMBER:8203-0144D SAMPLE DESCRIPTION:LOC #4 60 FT X 48 IN
ORDER NUMBER:.2044 SPECIAL INSTRUCTIONS:FILTER .45U, ANALYZE FILTRATE
DATE SAMPLED: 03/10/82 DATE PREP.: 03/16/82

LEAD	6.6	UG/G, WET WT.	MLD	178 / 33

--CONCLUSION--LAB NUMBER: 8203-0144D

LAB NUMBER:8203-0145 SAMPLE DESCRIPTION:LOC #5 230 FT X 12 IN
ORDER NUMBER:.2044 SPECIAL INSTRUCTIONS:ANALYZED AS RECEIVED
DATE SAMPLED: 03/10/82

HYDROCARBONS, TOTAL	191.	UG/G, DRY WT.	DEM	119 / 34

--CONCLUSION--LAB NUMBER: 8203-0145

LAB NUMBER:8203-0145D SAMPLE DESCRIPTION:LOC #5 230 FT X 12 IN
ORDER NUMBER:.2044 SPECIAL INSTRUCTIONS:ACID DIGESTION
DATE PREP.: 03/18/82

LEAD	13.6	UG/G, WET WT.	MLD	178 / 32

--CONCLUSION--LAB NUMBER: 8203-0145D

ND(),WHERE NOTED,INDICATES NONE DETECTED WITH THE DETECTION LIMIT IN PARENTHESES

ANALYSES WERE PERFORMED ON SAMPLES AS RECEIVED BY WILSON LABS UTILIZING APPROVED PROCEDURES PUBLISHED IN THE FEDERAL REGISTER, VOL. 44, NO. 233, DEC. 3, 1979 (69508-69575) AND AS AMENDED IN THE FED. REG., VOL. 44, NO. 244, DEC. 18, 1979.

WILSON LABORATORIES

Janis Butler

JANIS BUTLER, P.E.
LABORATORY DIRECTOR

APPENDIX C-3

ANALYTICAL RESULTS FOR THE SOIL SAMPLE TAKEN IN

THE NORTH PARKING LOT

Source: Closure Plan and Financial Requirements
for Interim Status Hazardous Waste Storage Facilities,
General Electric Co. Aircraft Engine Business Group
Albuquerque, NM Air Force Plant No. 83, August 1983

W I L S O N   L A B O R A T O R I E S

528 NORTH NINTH STREET - P.O. BOX 1858 - SALINA, KANSAS 67401 - (913)825-7186

LABORATORY REPORT

CLIENT: GENERAL ELECTRIC
ATTN: JIM HESSE
336 WOODWARD ROAD
ALBUQUERQUE, NM 87102

DATE RPTD.: 03/11/83
DATE RCVD.: 02/11/83
PURCHASE AUTH: B12243
FILE NO.: 81-9570

===

ANALYSIS	CONCENTRATION	UNITS	ANALYST	BOOK/PAGE

LAB NUMBER: 8302-0130
ORDER NUMBER: .3767
DATE SAMPLED: 01/06/83

SAMPLE DESCRIPTION: SOIL SAMPLE
SPECIAL INSTRUCTIONS: ANALYZE AS RECEIVED
TIME SAMPLED: 1140

GC/MS VOLATILE COMPOUNDS

ANALYSIS	CONCENTRATION	UNITS	ANALYST	BOOK/PAGE
1V. ACROLEIN	ND(1)	UG/G	CK	212 / 53
2V. ACRYLONITRILE	ND(1)	UG/G	CK	212 / 53
3V. BENZENE	ND(0.1)	UG/G	CK	212 / 53
4V. BIS(CHLOROMETHYL)ETHER	ND(0.1)	UG/G	CK	212 / 53
5V. BROMOFORM	ND(0.1)	UG/G	CK	212 / 53
6V. CARBON TETRACHLORIDE	ND(0.1)	UG/G	CK	212 / 53
7V. CHLOROBENZENE	ND(0.1)	UG/G	CK	212 / 53
8V. CHLORODIBROMOMETHANE	ND(0.1)	UG/G	CK	212 / 53
9V. CHLOROETHANE	ND(0.1)	UG/G	CK	212 / 53
10V. 2-CHLOROETHYLVINYL ETHER	ND(0.1)	UG/G	CK	212 / 53
11V. CHLOROFORM	ND(0.1)	UG/G	CK	212 / 53
12V. DICHLOROBROMOMETHANE	ND(0.1)	UG/G	CK	212 / 53
13V. DICHLORODIFLUOROMETHANE	ND(0.1)	UG/G	CK	212 / 53
14V. 1,1-DICHLOROETHANE	ND(0.1)	UG/G	CK	212 / 53
15V. 1,2-DICHLOROETHANE	ND(0.1)	UG/G	CK	212 / 53
16V. 1,1-DICHLOROETHYLENE	ND(0.1)	UG/G	CK	212 / 53
17V. 1,2-DICHLOROPROPANE	ND(0.1)	UG/G	CK	212 / 53
18V. 1,3-DICHLOROPROPYLENE	ND(0.1)	UG/G	CK	212 / 53
19V. ETHYLBENZENE	ND(0.1)	UG/G	CK	212 / 53
20V. METHYL BROMIDE	ND(0.1)	UG/G	CK	212 / 53
21V. METHYL CHLORIDE	ND(0.1)	UG/G	CK	212 / 53
22V. METHYLENE CHLORIDE	ND(0.1)	UG/G	CK	212 / 53
23V. 1,1,2,2-TETRACHLOROETHANE	ND(0.1)	UG/G	CK	212 / 53
24V. TETRACHLOROETHYLENE	ND(0.1)	UG/G	CK	212 / 53
25V. TOLUENE	ND(0.1)	UG/G	CK	212 / 53
26V. 1,2-TRANSDICHLOROETHYLENE	ND(0.1)	UG/G	CK	212 / 53
27V. 1,1,1-TRICHLOROETHANE	ND(0.1)	UG/G	CK	212 / 53
28V. 1,1,2-TRICHLOROETHANE	ND(0.1)	UG/G	CK	212 / 53
29V. TRICHLOROETHYLENE	ND(0.1)	UG/G	CK	212 / 53
30V. TRICHLOROFLUOROMETHANE	ND(0.1)	UG/G	CK	212 / 53
31V. VINYL CHLORIDE	ND(0.1)	UG/G	CK	212 / 53

--CONCLUSION--LAB NUMBER: 8302-0130

W I L S O N   L A B O R A T O R I E S

LABORATORY REPORT   PAGE 2
CLIENT:GENERAL ELECTRIC   DATE RPTD.:03/11/83

ANALYSIS	CONCENTRATION	UNITS	ANALYST	BOOK/PAGE

LAB NUMBER:8302-0130E   SAMPLE DESCRIPTION:SOIL SAMPLE
ORDER NUMBER:.3767   SPECIAL INSTRUCTIONS:EP TOXICITY
DATE SAMPLED: 01/06/83   TIME SAMPLED: 1140   DATE PREP.: 02/22/83

ARSENIC	0.11	MG/L	BTF	222 / 13
BARIUM	0.65	MG/L	DEM	225 / 16
CADMIUM	0.01	MG/L	BTF	192 / 66
CHROMIUM, TOTAL	ND(0.05)	MG/L	BTF	192 / 67
LEAD	0.1	MG/L	BTF	192 / 67
MERCURY	ND(0.01)	MG/L	MJB	224 / 7
SELENIUM	ND(0.001)	MG/L	BTF	222 / 14
SILVER	ND(0.01)	MG/L	BTF	192 / 67

--CONCLUSION--LAB NUMBER: 8302-0130E

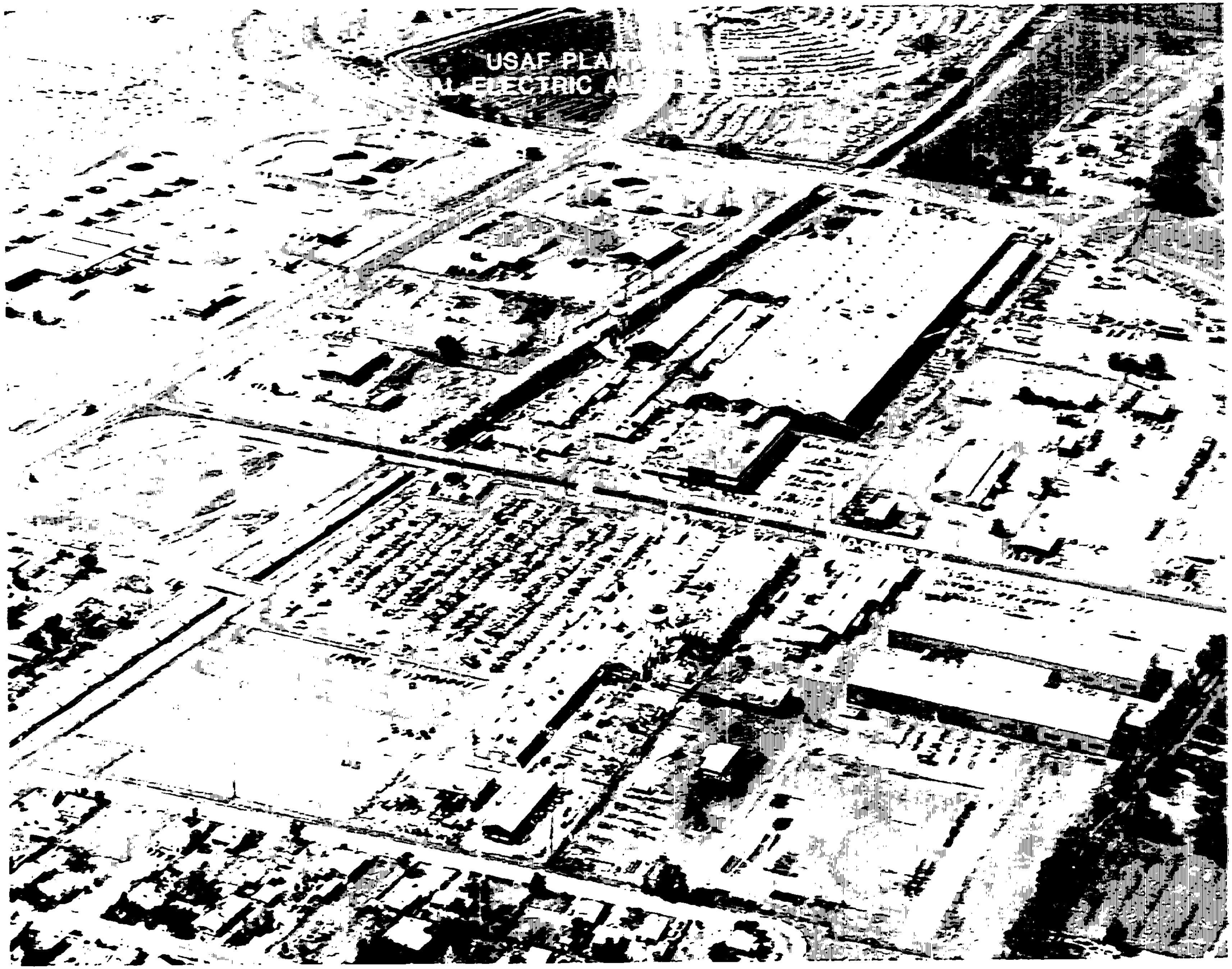
LAB NUMBER:8302-0131   SAMPLE DESCRIPTION:WASTE TRIMSOL
ORDER NUMBER:.3767   SPECIAL INSTRUCTIONS:ANALYZE AS RECEIVED
DATE SAMPLED: 02/09/83

GC/MS VOLATILE COMPOUNDS

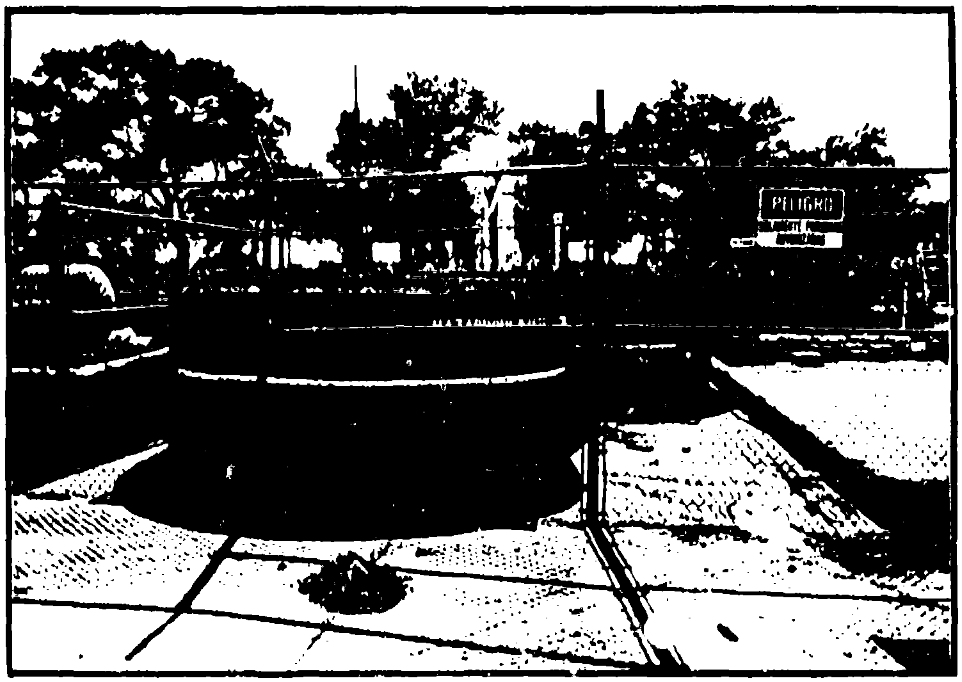
1V. ACROLEIN	ND(10)	MG/L	CK	212 / 53
2V. ACRYLONITRILE	ND(10)	MG/L	CK	212 / 53
3V. BENZENE	ND(1)	MG/L	CK	212 / 53
4V. BIS(CHLOROMETHYL)ETHER	ND(1)	MG/L	CK	212 / 53
5V. BROMOFORM	ND(1)	MG/L	CK	212 / 53
6V. CARBON TETRACHLORIDE	37.	MG/L	CK	212 / 53
7V. CHLOROBENZENE	ND(1)	MG/L	CK	212 / 53
8V. CHLORODIBROMOMETHANE	ND(1)	MG/L	CK	212 / 53
9V. CHLOROETHANE	ND(1)	MG/L	CK	212 / 53
10V. 2-CHLOROETHYLVINYL ETHER	ND(1)	MG/L	CK	212 / 53
11V. CHLOROFORM	ND(1)	MG/L	CK	212 / 53
12V. DICHLOROBROMOMETHANE	ND(1)	MG/L	CK	212 / 53
13V. DICHLORODIFLUOROMETHANE	ND(1)	MG/L	CK	212 / 53
14V. 1,1-DICHLOROETHANE	ND(1)	MG/L	CK	212 / 53
15V. 1,2-DICHLOROETHANE	ND(1)	MG/L	CK	212 / 53
16V. 1,1-DICHLOROETHYLENE	2.	MG/L	CK	212 / 53
17V. 1,2-DICHLOROPROPANE	ND(1)	MG/L	CK	212 / 53
18V. 1,3-DICHLOROPROPYLENE	ND(1)	MG/L	CK	212 / 53
19V. ETHYLBENZENE	ND(1)	MG/L	CK	212 / 53
20V. METHYL BROMIDE	ND(1)	MG/L	CK	212 / 53
21V. METHYL CHLORIDE	ND(1)	MG/L	CK	212 / 53
22V. METHYLENE CHLORIDE	ND(1)	MG/L	CK	212 / 53
23V. 1,1,2,2-TETRACHLOROETHANE	ND(1)	MG/L	CK	212 / 53
24V. TETRACHLOROETHYLENE	ND(1)	MG/L	CK	212 / 53
25V. TOLUENE	ND(1)	MG/L	CK	212 / 53

APPENDIX D

PHOTOGRAPHS

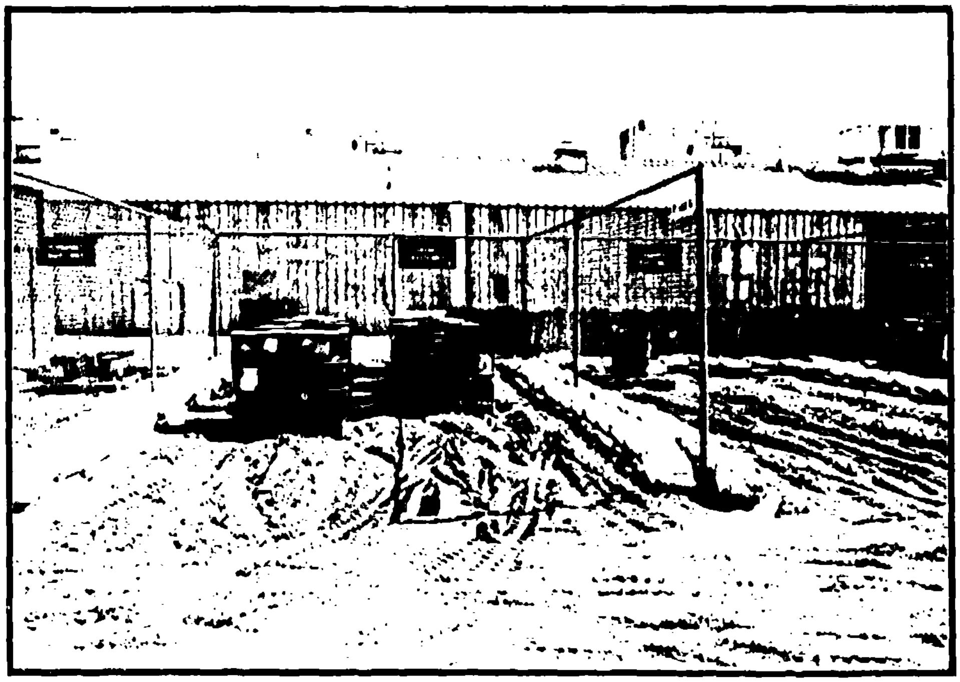

USAF PLA
ELECTRIC A

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT



Hazardous Waste Storage Area No. 1

USAF PLANT NO. 83
GENERAL ELECTRIC ALBUQUERQUE PLANT



Hazardous Waste Storage Area No. 3

APPENDIX E

USAF INSTALLATION RESTORATION PROGRAM

HAZARD ASSESSMENT RATING METHODOLOGY

APPENDIX E

USAF INSTALLATION RESTORATION PROGRAM
HAZARD ASSESSMENT RATING METHODOLOGY

BACKGROUND

The Department of Defense (DOD) has established a comprehensive program to identify, evaluate, and control problems associated with past disposal practices at DOD facilities. One of the actions required under this program is to:

> "develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts." (Reference: DEQPPM 81-5, aa December 1981).

Accordingly, the United States Air Force (USAF) has sought to establish a system to set priorities for taking further actions at sites based upon information gathered during the Secords Search phase of its Installation Restoration Program (IRP).

The first site rating model was developed in June 1981 at a meeting with represenatives from USAF Occupational and Environmental Health Laboratory (OEHL), Air Force Engineering and Services Center (AFESC), Engineering-Science (ES) and CH2M Hill. The basis for this model was a system developed for EPA by JRB Associates of McLean, Virginia. The JRB model was modified to meet Air Force needs.

After using this model for 6 months at over 20 Air Force installations, certain inadequacies became apparent. Therefore, on January 26 and 27, 1982, representatives of USAF OEHL, AFESC, various major commands, Engineering-Science, and CH2M Hill met to address the inadequacies. The result of the meeting was a new site rating model designed to present a better picture of the hazards posed by sites at Air Force installations. The new rating model described in this presentation is referred to as the Hazard Assessment Rating Methodology.

PURPOSE

The purpose of the site rating model is to provide a relative ranking of sites of suspected contamination from hazardous substances. This model will assist the Air Force in setting priorities for follow-on site investigations and confirmation work under Phase II of the IRP.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous wastes present in sufficient quantity), and (2) potential for migration exists. A site can be deleted from consideration for rating on either basis.

DESCRIPTION OF MODEL

Like the other hazardous waste site ranking models, the U.S. Air Force's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DOD program needs.

The model uses data readily obtained during the Records Search portion (Phase I) of the IRP. Scoring judgments and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and the worst hazards at the site. Sites are given low scores only if there are clearly no hazards at the site. This approach meshes well with the policy for evaluating and setting restrictions on excess DOD properties.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: the possible receptors of the contamination, the waste and its characteristics, potential pathways for waste contaminant migration, and any efforts to contain the contaminants. Each of these categories contains a number of rating factors that are used in the overall hazard rating.

The receptors category rating is calculated by scoring each factor, multiplying by a factor weighting constant and adding the weighted scores to obtain a total category score.

The pathways category rating is based on evidence of contaminant migration or an evaluation of the highest potential (worst case) for contaminant migration along one of three pathways. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among three possible routes is used. These routes are surface water migration, flooding, and ground-water migration. Evaluation of each route involves factors associated with the particular migration route. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score, while scores for sludges and solids are reduced.

The scores for each of the three categories are then added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Sites at which there is no containment are not reduced in score. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the scores for the other three categories.

FIGURE 1

HAZARD ASSESSMENT RATING METHODOLOGY FLOW CHART

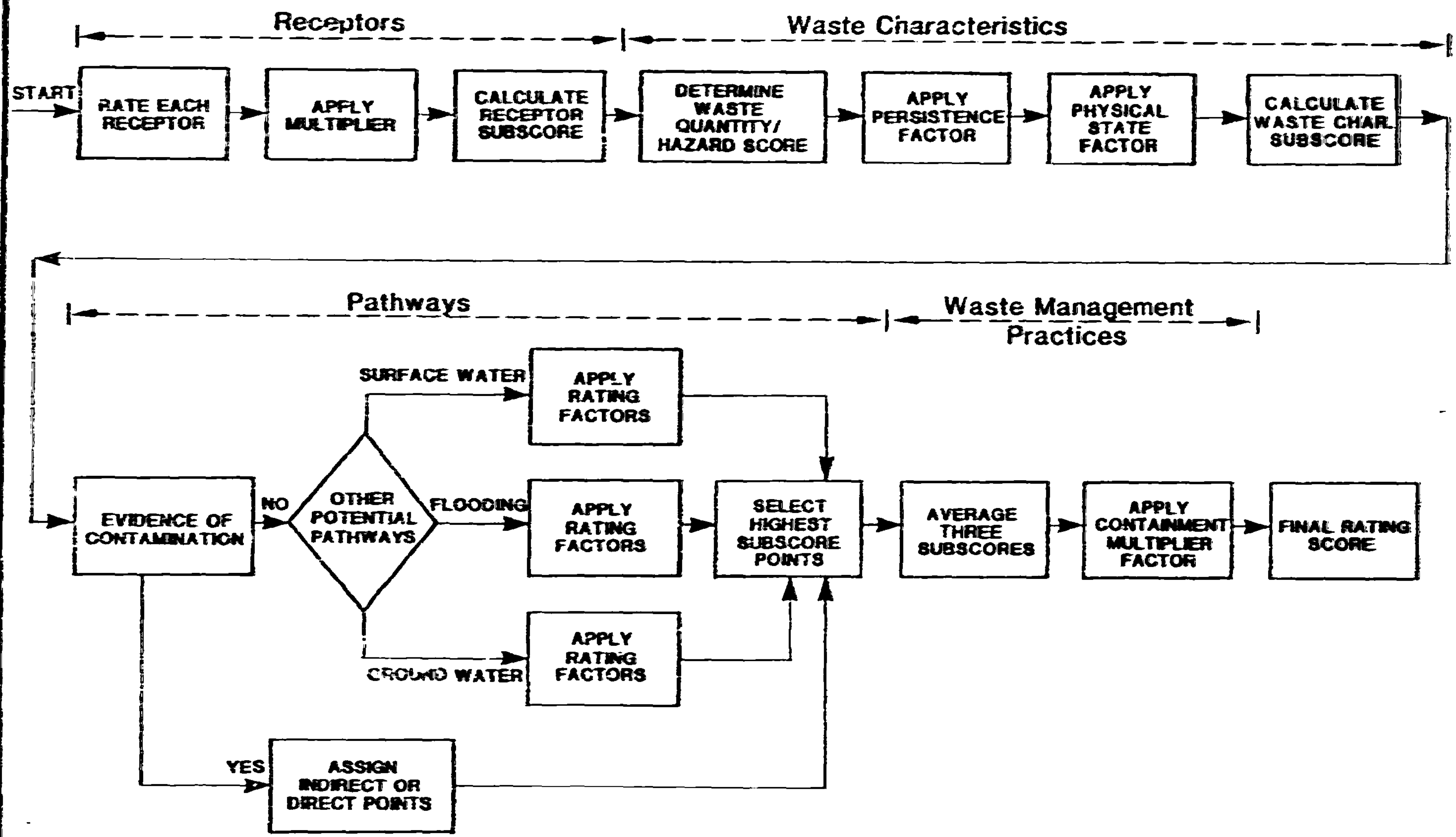


FIGURE 2

HAZARD ASSESSMENT RATING METHODOLOGY FORM

NAME OF SITE ______________________________

LOCATION ______________________________

DATE OF OPERATION OR OCCURRENCE ______________________________

OWNER/OPERATOR ______________________________

COMMENTS/DESCRIPTION ______________________________

SITE RATED BY ______________________________

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site		4		
B. Distance to nearest well		10		
C. Land use/zoning within 1 mile radius		3		
D. Distance to reservation boundary		6		
E. Critical environments within 1 mile radius of site		10		
F. Water quality of nearest surface water body		6		
G. Ground water use of uppermost aquifer		9		
H. Population served by surface water supply within 3 miles downstream of site		6		
I. Population served by ground-water supply within 3 miles of site		6		
Subtotals			______	______

Receptors subscore (100 X factor score subtotal/maximum score subtotal) ______

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) ______
2. Confidence level (C = confirmed, S = suspected) ______
3. Hazard rating (H = high, M = medium, L = low) ______

Factor Subscore A (from 20 to 100 based on factor score matrix) ______

B. Apply persistence factor
Factor Subscore A X Persistence Factor = Subscore B

______ X ______ = ______

C. Apply physical state multiplier

Subscore B X Physical State Multiplier = Waste Characteristics Subscore

______ X ______ = ______

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore ______

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating, and proceed to C.

1. Surface water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Distance to nearest surface water		8		
Net precipitation		6		
Surface erosion		8		
Surface permeability		6		
Rainfall intensity		8		
		Subtotals	______	______

Subscore (100 X factor score subtotal/maximum score subtotal) ______

2. Flooding

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Flooding		1		

Subscore (100 x factor score/3) ______

3. Ground-water migration

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
Depth to ground water		8		
Net precipitation		6		
Soil permeability		8		
Subsurface flows		8		
Direct access to ground water		8		
		Subtotals	______	______

Subscore (100 x factor score subtotal/maximum score subtotal) ______

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore ______

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors ______
Waste Characteristics ______
Pathways ______

Total ______ divided by 3 = ______
Gross Total Score

B. Apply factor for waste containment from waste management practices

Gross Total Score X Waste Management Practices Factor = Final Score

______ X ______ = ______

TABLE 1

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1 - 25	26 - 100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land Use/Zoning (within 1 mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1 mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wet-lands; preserved areas; presence of economically impor-tant natural re-sources susceptible to contamination.	Major habitat of an en-dangered or threatened species; presence of recharge area; major wetlands.	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use.	Recreation, propa-gation and manage-ment of fish and wildlife.	Shellfish propaga-tion and harvesting.	Potable water supplies	6
G. Ground-Water use of uppermost aquifer	Not used, other sources readily available.	Commercial, in-dustrial, or irrigation, very limited other water sources.	Drinking water, municipal water available.	Drinking water, no muni-cipal water available; commercial, industrial, or irrigation, no other water source available.	9
H. Population served by surface water supplies within 3 miles down-stream of site	0	1 - 50	51 - 1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1 - 50	51 - 1,000	Greater than 1, 000	6

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS

A-1 Hazardous Waste Quantity

S = Small quantity (<5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (>20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records.
- o Knowledge of types and quantities of wastes generated by shops and other areas on base.
- o Based on the above, a determination of the types and quantities of waste disposed of at the site.

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records.
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site.

A-3 Hazard Rating

Hazard Category	Rating Scale Levels 0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

II. WASTE CHARACTERISTICS (Continued)

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
80	L	C	M
	M	C	H
70	L	S	H
60	S	C	H
	M	C	M
50	L	S	M
	L	C	L
	M	S	H
	S	C	M
40	S	S	H
	M	S	M
	M	C	L
	L	S	L
30	S	C	L
	M	S	L
	S	S	M
20	S	S	L

Notes:

For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- o Confirmed confidence levels (C) can be added
- o Suspected confidence levels (S) can be added
- o Confirmed confidence levels cannot be added with suspected confidence levels

Waste Hazard Rating

- o Wastes with the same hazard rating can be added
- o Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCH = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical State	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, ground water, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 POTENTIAL FOR SURFACE WATER CONTAMINATION

Rating Factor	Rating Scale Levels 0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to 1 mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 in.	-10 to + 5 in.	+5 to +20 in.	Greater than +20 in.	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($<10^{-6}$ cm/sec)	6
Rainfall intensity based on 1 year 24-hr rainfall	<1.0 inch	1.0-2.0 inches	2.1-3.0 inches	>3.0 inches	8
B-2 POTENTIAL FOR FLOODING					
Floodplain	Beyond 100-year floodplain	In 25-year floodplain	In 10-year floodplain	Floods annually	1
B-3 POTENTIAL FOR GROUND-WATER CONTAMINATION					
Depth to ground water	Greater than 500 ft	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 in.	-10 to +5 in.	+5 to +20 in.	Greater than +20 in.	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high ground-water level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean ground-water level	8
Direct access to ground water (through faults, fractures, faulty well casings, subsidence fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

TABLE 1 (Continued)

HAZARD ASSESSMENT RATING METHODOLOGY GUIDELINES

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. WASTE MANAGEMENT PRACTICES FACTOR

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- Clay cap or other impermeable cover
- Leachate collection system
- Liners in good condition
- Adequate monitoring wells

Spills:

- Quick spill cleanup action taken
- Contaminated soil removed
- Soil and/or water samples confirm total cleanup of the spill

Surface Impoundments:

- Liners in good condition
- Sound dikes and adequate freeboard
- Adequate monitoring wells

Fire Proection Training Areas:

- Concrete surface and berms
- Oil/water separator for pretreatment of runoff
- Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1 or III-B-3, then leave blank for calculation of factor score and maximum possible score.

APPENDIX F

HAZARDOUS ASSESSMENT SITE RATING FORMS

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HAZARD ASSESSMENT RATING METHODOLOGY FORMS

PLANT NO. 83

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5.	Underground Cyanide Vault	51	F-9

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: North Parking Lot
Location: North end of plant
Date of Operation or Occurrence: 1979 - 1980
Owner/Operator: USAF
Comments/Description: Contaminated oils sprayed on bare earth lot for dust control

Site Rated by: Mark Spiegel, Dan Harman

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			144	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 80

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 3
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 2

Factor Subscore A (from 20 to 100 based on factor score matrix) 80

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

80 x 1.00 = 80

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

80 x 1.00 = 80

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	1	8	8	24
Subtotals			44	108
Subscore (100 x factor score subtotal/maximum score subtotal)				41
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			24	114
Subscore (100 x factor score subtotal/maximum score subtotal)				21

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 41

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		80
Waste Characteristics		80
Pathways		41
Total	201	divided by 3 = 67 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

67 x 0.95 = 64

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Hazardous Waste Storage No. 1
Location: South boundary of plant
Date of Operation or Occurrence: 1954 - Present
Owner/Operator: USAF
Comments/Description: Used to store waste chemicals and oils

Site Rated by: Mark Spiegel, Dan Harman

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			144	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 80

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.00 = 60

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.00 = 60

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	0	8	0	24
Surface permeability	3	6	18	18
Rainfall intensity	1	8	8	24
Subtotals			50	108
Subscore (100 x factor score subtotal/maximum score subtotal)				46
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	0	8	0	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			16	114
Subscore (100 x factor score subtotal/maximum score subtotal)				14

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 46

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	80
Waste Characteristics	60
Pathways	46
Total	186 divided by 3 = 62 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

62 x 1.00 = 62

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Hazardous Waste Storage No. 3
Location: North end of plant between Buildings 21 and 30
Date of Operation or Occurrence: Late 1950's to Present
Owner/Operator: USAF
Comments/Description: Used to store chemical wastes

Site Rated by: Mark Spiegel, Dan Harman

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			144	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 80

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 60

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

60 x 1.00 = 60

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

60 x 1.00 = 60

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	1	8	8	24
Surface permeability	2	6	12	18
Rainfall intensity	1	8	8	24
Subtotals			52	108
Subscore (100 x factor score subtotal/maximum score subtotal)				48
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			24	114
Subscore (100 x factor score subtotal/maximum score subtotal)				21

C. Highest pathway subscore.

Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 41

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		80
Waste Characteristics		60
Pathways		41
Total	181	divided by 3 = 60 Gross total score

B. Apply factor for waste containment from waste management practices.

Gross total score x waste management practices factor = final score

60 x 1.00 = 60

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Hazardous Waste Storage No. 4
Location: Parking lot east of Building No. 30, North end of plant
Date of Operation or Occurrence: 1970's to 1981
Owner/Operator: USAF
Comments/Description: Used for storage of waste 1,1,1 trichloroethane and Freon

Site Rated by: Mark Spigel, Dan Harman

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer	3	9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			144	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 80

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

50 x 1.00 = 50

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

50 x 1.00 = 50

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	1	8	8	24
Subtotals			44	108
Subscore (100 x factor score subtotal/maximum score subtotal)				41
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	0	8	0	24
Subtotals			24	114
Subscore (100 x factor score subtotal/maximum score subtotal)				21

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 41

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		80	
Waste Characteristics		50	
Pathways		41	
Total	171 divided by 3 =		57 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

57 x 0.95 = 54

FINAL SCORE

HAZARD ASSESSMENT RATING METHODOLOGY FORM

Name of Site: Underground Cyanide Vault
Location: East of Building No. 7
Date of Operation or Occurrence: Mid 1950's to late 1970's
Owner/Operator: USAF
Comments/Description: used to collect spilled plating waste

Site Rated by: Mark Spiegel, Dan Harman

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
A. Population within 1,000 feet of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use/zoning within 1 mile radius	3	3	9	9
D. Distance to reservation boundary	3	6	18	18
E. Critical environments within 1 mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	0	6	0	18
G. Ground water use of uppermost aquifer		9	27	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by ground-water supply within 3 miles of site	3	6	18	18
Subtotals			144	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 80

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (1=small, 2=medium, 3=large) 1
2. Confidence level (1=confirmed, 2=suspected) 1
3. Hazard rating (1=low, 2=medium, 3=high) 3

Factor Subscore A (from 20 to 100 based on factor score matrix) 40

B. Apply persistence factor
Factor Subscore A x Persistence Factor = Subscore B

40 x 1.00 = 40

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.00 = 40

III. PATHWAYS

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 0

B. Rate the migration potential for 3 potential pathways: surface water migration, flooding, and ground-water migration. Select the highest rating and proceed to C.

Rating Factor	Factor Rating (0-3)	Multi-plier	Factor Score	Maximum Possible Score
1. Surface Water Migration				
Distance to nearest surface water	3	8	24	24
Net precipitation	0	6	0	18
Surface erosion	0	8	0	24
Surface permeability	2	6	12	18
Rainfall intensity	1	8	8	24
Subtotals			44	108
Subscore (100 x factor score subtotal/maximum score subtotal)				41
2. Flooding	0	1	0	3
Subscore (100 x factor score/3)				0
3. Ground-water migration				
Depth to ground water	2	8	16	24
Net precipitation	0	6	0	18
Soil permeability	1	8	8	24
Subsurface flows	0	8	0	24
Direct access to ground water	1	8	8	24
Subtotals			32	114
Subscore (100 x factor score subtotal/maximum score subtotal)				28

C. Highest pathway subscore.
Enter the highest subscore value from A, B-1, B-2 or B-3 above.

Pathways Subscore 41

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors		80
Waste Characteristics		40
Pathways		41
Total	161	divided by 3 = 54 Gross total score

B. Apply factor for waste containment from waste management practices.
Gross total score x waste management practices factor = final score

54 x 0.95 = 51 FINAL SCORE

APPENDIX G

REFERENCES

APPENDIX G
REFERENCES

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APPENDIX H

GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

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GLOSSARY OF TERMINOLOGY AND ABBREVIATIONS

ACF: American Car and Foundary, Incorporated

AF: Air Force.

AFESC: Air Force Engineering and Services Center.

Ag: Chemical symbol for silver.

Al: Chemical symbol for aluminum.

ALLUVIUM: Materials eroded, transported and deposited by streams.

ALLUVIAL FAN: A fan-shaped deposit formed by a stream either where it issues from a narrow mountain valley into a plain or broad valley, or where a tributary stream joins a main stream.

ALODINE 1200: Alumigold Tinco Mil L-5541.

ARTESIAN: Ground water contained under hydrostatic pressure.

ASD/PMD: Aeronautical Systems Division, Directorate of Manufacturing.

AQUIFER: A geologic formation, group of formations, or part of a formation that is capable of yielding water to a well or spring.

AROMATIC: Description of organic chemical compounds in which the carbon atoms are arranged into a ring with special electron stability associated. Aromatic compounds are often more reactive than non-aromatics.

Ba: Chemical symbol for barium.

BIOACCUMULATE: Tendency of elements or compounds to accumulate or build up in the tissues of living organisms when they are exposed to these elements in their environments, e.g., heavy metals.

BIODEGRADABLE: The characteristic of a substance to be broken down from complex t simple compounds by microorganisms.

$CaCO_3$: Chemical symbol for calcium carbonate.

CAYTUR 21: Methleyene Dianaline.

Cd: Chemical symbol for cadmium.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act.

CIRCA: About; used to indicate an approximate date.

CLOSURE: The completion of a set of rigidly defined functions for a hazardous waste facility no longer in operation.

CN: Chemical symbol for cyanide.

COD: Chemical Oxygen Demand, a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water.

COE: Corps of Engineers.

CONFINED AQUIFER: An aquifer bounded above and below by impermeable strata or by geologic units of distinctly lower permeability than that of the aquifer itself.

CONFINING UNIT: An aquitard or other poorly permeable layer which restricts the movement of ground water.

CONTAMINATION: The degradation of natural water quality to the extent that its usefulness is impaired; there is no implication of any specific limits since the degree of permissible contamination depends upon the intended end use or uses of the water.

COOLANT: Lubricant used during machining and cutting processes (e.g., Simcool, Trimsol).

Cr: Chemical symbol for chromium.

Cu: Chemical symbol for copper.

DCAS: Defense Contract Administration Services

DIP: The angle at which a stratum is inclined from the horizontal.

DISPOSAL FACILITY: A facility or part of a facility at which hazardous waste is intentionally placed into or on land or water, and at which waste will remain after closure.

DISPOSAL OF HAZARDOUS WASTE: The discharge, deposit, injection, dumping, spilling, or placing of any hazardous waste into or on land or water so that such waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground water.

DOD: Department of Defense.

DOE: U. S. Department of Energy.

DOW 17 ANODIZE: Sandia Spec 400184, Anodizing Magnesium.

DOWNGRADIENT: In the direction of decreasing hydraulic static head; the direction in which ground water flows.

EDM OIL: Electrical discharge machining oil.

EFFLUENT: A liquid waste discharge from a manufacturing or treatment process, in its natural state, or partially or completely treated, that discharges into the environment.

EP: Extraction Procedure, the EPA's standard laboratory procedure for leachate generation.

EPA: U.S. Environmental Protection Agency.

EPHEMERAL AQUIFER: A water-bearing zone typically located near the surface which normally contains water seasonally.

EROSION: The wearing away of land surface by wind, water, or chemical processes.

ES: Engineering-Science, Inc.

EXTRACTION PROCEDURE TOXICITY METALS: Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium and Silver

FACILITY: Any land and appurtenances thereon and thereto used for the treatment, storage and/or disposal of hazardous wastes.

FAULT: A fracture in rock along which the adjacent rock surfaces are differentially displaced.

Fe: Chemical symbol for iron.

FLOOD PLAIN: The lowland and relatively flat areas adjoining inland and coastal areas of the mainland and off-shore islands, including, at a minimum, areas subject to a one percent or greater chance of flooding in any given year.

FLOW PATH: The direction or movement of ground water as governed principally by the hydraulic gradient.

GC/MS: Gas chromatograph/mass spectrophotometer, a laboratory procedure for identifying unknown compounds.

GE: General Electric Company

GROUND WATER: Water beneath the land surface in the saturated zone that is under atmospheric or artesian pressure.

GROUND WATER RESERVOIR: The earth materials and the intervening open spaces that contain ground water.

HALOGEN: The class of chemical elements including fluorine, chlorine, bromine, and iodine.

HARDFILL: Disposal sites receiving construction debris, wood, miscellaneous spoil material.

HARM: Hazard Assessment Rating Methodology.

HAZARDOUS SUBSTANCE: Under CERCLA, the definition of hazardous substance includes:

1. All substances regulated under Paragraphs 311 and 307 of the Clean Water Act (except oil);

2. All substances regulated under Paragraph 3001 of the Solid Waste Disposal Act:

3. All substances regulated under Paragraph 112 of the Clean Air Act;

4. All substances which the Administrator of EPA has acted against under Paragraph 7 of the Toxic Substance Control Act;

5. Additional substances designated under Paragraph 102 of the Superfund bill.

HAZARDOUS WASTE: As defined in RCRA, a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

HAZARDOUS WASTE GENERATION: The act or process of producing a hazardous waste.

HEAVY METALS: Metallic elements, including the transition series, which include many elements required for plant and animal nutrition in trace concentrations but which become toxic at higher concentrations.

Hg: Chemical symbol for mercury.

HWMF: Hazardous Waste Management Facility.

HYDROCARBONS: Organic chemical compounds composed of hydrogen and carbon atoms chemically bonded. Hydrocarbons may be straight chain, cyclic, branched chain, aromatic, or polycyclic, d^pending upon arrangement of carbon atoms. Halogentated hydrocarbons are hydrocarbons in which one or more hydrogen atoms has been replaced by a halogen atom.

INCOMPATIBLE WASTE: A waste unsuitable for commingling with another waste or material because the commingling might result in generation of extreme heat or pressure, explosion or violent reaction, fire, formation of substances which are shock sensitive, friction sensitive, or otherwise have the potential for reacting violently, formation of toxic dusts, mists, fumes, and gases, volatilization of ignitable or toxic chemicals due to heat generation in such a manner that the likelihood of contamination of ground water or escape of the substance into the environment is increased, any other reaction which might result in not meeting the air, human health, and environmental standards.

INFILTRATION: The movement of water through the soil surface into the ground.

IRIDITE #1: Chromate solution.

IRP: Installation Restoration Program.

LEACHATE: A solution resulting from the separation or dissolving of soluble or particulate constituents from solid waste or other man-placed medium by percolation of water.

LEACHING: The process by which soluble materials in the soil, such as nutrients, pesticide chemicals or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

LINER: A continous layer of natural or man-made materials beneath or on the sides of a surface impoundment, landfill, or landfill cell which restricts the downward or lateral escape of hazardous waste, hazardous waste constituents or leachate.

LITHOLOGY: The description of the physical character of a rock.

LYSIMETER: A vacuum operated sampling device used for extracting pore water samples at various depths within the unsaturated zone.

MGD: Million Gallons per Day.

Mn: Chemical symbol for manganese.

MONITORING WELL: A well used to measure ground-water levels and to obtain samples.

MS 123: Freon solution.

MSL: Mean Sea Level.

NDI: Non-destructive Inspection.

NET PRECIPITATION: The amount of annual precipitation minus annual evaporation.

NGVD: National Geodetic Vertical Datum of 1929.

Ni: Chemical symbol for nickel.

NMEID: New Mexico Environmental Improvement Division

NMHED: New Mexico Health and Environment Department

NMWQCC: New Mexico Water Quality Control Commission

NOAA: National Oceanic and Atmospheric Administration.

NPDES: National Pollutant Discharge Elimination System.

OEHL: Occupational and Environmental Health Laboratory.

ORGANIC: Being, containing or relating to carbon compounds, especially in which hydrogen is attached to carbon.

O&G: Symbols for oil and grease.

Pb: Chemical symbol for lead.

PCB: Polychlorinated Biphenyl; liquids used as a dielectrics in electrical equipment.

PERCOLATION: Movement of moisture by gravity or hydrostatic pressure through interstices of unsaturated rock or soil.

PERMEABILITY: The capacity of a porous rock, soil or sediment for transmitting a fluid without damage to the structure of the medium.

PERSISTENCE: As applied to chemicals, those which are very stable and remain in the enviornment in their original form for an extended period of time.

pH: Negative logarithm of hydrogen ion concentration.

POLLUTANT: Any introduced gas, liquid or solid that makes a resource unfit for a specific purpose.

POLYCYCLIC COMPOUND: All compounds in which carbon atoms are arranged into two or more rings, usually aromatic in nature.

POTENTIALLY ACTIVE FAULT: A fault along which movement has occurred within the last 25-million years.

POTENTIOMETRIC SURFACE: The surface to which water in an aquifer would rise through tightly cased wells open only to the aquifer.

PPB: Parts per billion by weight.

PPM: Parts per million by weight.

PRECIPITATION: Rainfall.

QUATERNARY MATERIALS: The second period of the Cenozoic geologic era, following the Tertiary, and including the last 2-3 million years.

RCRA: Resource Conservation and Recovery Act.

RECEPTORS: The potential impact group or resource for a waste contamination source.

RECHARGE AREA: A surface area in which surface water or precipitation percolates through the unsaturated zone and eventually reaches the zone of saturation. Recharge areas may be natural or manmade.

RECHARGE: The addition of water to the ground-water system by natural or artificial processes.

SANITARY LANDFILL: A land disposal site using an engineered method of disposing solid wastes on land in a way that minimizes environmental hazards.

SATURATED ZONE: That part of the earth's crust in which all voids are filled with water.

SAX'S TOXICITY: A rating method for evaluating the toxicity of chemical materials.

SCS: U.S. Department of Agriculture Soil Conservation Service.

SEISMICITY: Pertaining to earthquakes or earth vibrations.

SIMCOOL: Water base coolant.

SLUDGE: Any garbage, refuse, or slude from a waste treatment plant, water supply treatment, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

SMUT-GO: Chromate nitric acid solution.

SOLID WASTE: Any garbage, refuse, or sludge from a waste treatment plant, water supply treatment, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, or agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges which are point source subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 USC 880); or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954 (68 USC 923).

SPILL: Any unplanned release or discharge of a hazardous waste onto or into the air, land, or water.

STORAGE OF HAZARDOUS WASTE: Containment, either on a temporary basis or for a longer period, in such a manner as not to constitute disposal of such hazardous waste.

TCE: Trichloroethylene.

TDS: Total Dissolved Solid, a water quality parameter.

TOC: Total Organic Carbon.

TOXICITY: The ability of a material to produce injury or disease upon exposure, ingestion, inhalation, or assimilation by a living organism.

TRANSMISSIVITY: The rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

TREATMENT OF HAZARDOUS WASTE: Any method, technique, or process including neutralization designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize the waste or so as to render the waste nonhazardous.

TRIMSOL: Water base coolant.

TSD: Treatment, storage or disposal.

TUCO 4409: Amonium bifluoride.

TURCO ARR: Alkaline rust remover, 88-95% NaOH

TURCO AVIATION: Trisodium phosphate.

UPGRADIENT: In the direction of increasing hydraulic static head; the direction opposite to the prevailing flow of ground-water.

USAF: United States Air Force.

USDA: United States Department of Agriculture

USFWS: United States Fish and Wildlife Service.

USGS: United States Geological Survey.

WATER TABLE: Surface of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

Zn: Chemical symbol for zinc.